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THE NEW YORK ELECTRIC CLUB.

Not long since some of those residents of New York city who are interested in or identified with movements or associations formed for the purpose of developing the business of electric lighting, etc., determined that the time was ripe for the organization of an association which would afford opportunity for its members to compare notes, report progress, institute experiments—in short, to put them in better position to guard the interests of their pet projects. Certainly, this was a praiseworthy scheme, and likely to bring forth fruit of a sound description. The broaching of the matter was attended with such ready affirmation on the part of those sounded that permanent organization was speedily effected. The founders decided to bring into special prominence those social features which are calculated to make the hours pass away pleasantly, thus at one stroke combining mental pabulum with creature comfort. Having duly received the patronymic of the New York Electric Club, a date (Nov. 4) was set for the first monthly reunion, the programme for which included a dinner and a debate, and the Hotel Dam was named as a fitting hostelry and a likely forum. It should be further remarked that the debatable subject was to be furnished primarily by the presentation of a paper by one of the members who was free to select his topic, provided the same treated on any one of the branches allied to the science, art or business of electricity. So far so good. It seems that a certain Dr. Geo. H. Benjamin was chosen to present the first paper, and when the guests were in that comfortable frame of mind and body supposed to follow the absorption of a good dinner, the Doctor set out to deliver the initial contribution to the literary records of the Electric Club. As near as we can make out, for gas men are not yet looked upon by the electricians as being in complete fraternal harmony with the latter, and hence we are not able to speak with exactness in the premises, the Doctor's paper bore the title of, "Rules to be observed in handling electric currents, as used in electric lighting and the transmission of power," and in the preamble, or before the "rules" were laid down, the author most sensibly and logically addressed himself to the causes which called for the formulation of lines of strict guidance to be observed by the builders of electric lighting plants. On page 298 of this issue we give a partial reproduction of the Doctor's argument, and regret our inability to publish it *in extenso*, the failure to do so being solely attributable to the fact that he is disinclined to allow it. However, from printed reports of the proceedings at the Hotel Dam, as these were rather disjointedly given in the newspapers of the following morning, we may supplement our current publication of Dr. Benjamin's paper by stating that his statistics (carefully suppressed by him or somebody else in the copy from which our report was taken) show a loss of 13 human lives, and the destruction of over $1,300,000 worth of property in this country during the past year directly traceable to the carelessness, imbecility or parsimony of those in charge of the supply and maintenance of electric light. The Doctor evidently thought that his auditors would be in accord with him on the necessity of remedying the evils which existed, and was none the less sure that the "Club" would be deeply interested by his remarks. As to the latter there could be no doubt, for they were not only interested but absolutely electrified. When he resumed his seat, ready to take part in the debate that was to follow, some half a dozen or more of the clubites were struggling to catch the president's nod of recognition, which was secured by a Mr. J. F. Morrison, of Baltimore, Md., who is President of the National Electric Light Association. This gentleman excitedly stated that the Doctor's statistics were false, and that his

charges of gross carelessness on the part of the managers of the offending electric companies were on a par with the statistics. Much more of a like nature was blurted out by Mr. Morrison, and the Doctor, who viewed with amazement the storm he had created, finally managed to reply to his critic that he (Mr. Morrison) looked at the "matter from a business point of view," while the Doctor "treated it as a scientist." This so enraged the Baltimorean that he, advancing in a threatening manner towards the Doctor, shouted, "You a scientist! Science does not lie." Thus the climax was reached, and what an effective one it was to cap the "club's" first dinner with. Mr. Morrison moved that the paper be not printed, but was finally appeased to the extent of agreeing to a substitute, which ordered that the statistics and introductory remarks be eliminated, but that the rules be published. Naturally enough this seemed to the Doctor to be a case of playing Hamlet minus the melancholy Dane, and he announced that he would resign from the "club," and print the paper on his own hook—a plan of action which the Doctor subsequently recanted. Of course, the squabbles of the "Electric Club" are not of overshadowing importance to those connected with the gas industry; but they are interesting to this extent, at least. They show that electricians of the Morrison stripe—and unfortunately he has many companions—are inclined to make hay while the sun shines, no matter at what cost to the public the crop is garnered, and that misrepresentation and concealment are the devices most likely to be favored by them in the advancement of their aims. Then, again, Dr. Benjamin's figures are likely to give food for thought, while at the same time they but emphasize the urgent necessity which exists, and which hourly attains greater magnitude, for causing the compulsory underground placing of electric light conductors. Our item columns in the last few issues of the JOURNAL show plainly who is most worthy of credence as between Dr. Benjamin and Mr. Morrison.

MR. RAMSDELL'S PAPER ON GAS COMMISSIONS.

In our current chapters of the official report of the proceedings of the Philadelphia meeting of the American Gas Light Association will be found Mr. Geo. G. Ramsdell's paper on "Gas Commissions." We presume it is needless to ask our readers to give close attention to its contents, for these cannot fail to be replete with interest for them. The Vincennes commentator assumes a positive attitude in regard to the question discussed, and without hesitation calls up and combats the arguments likely to be put forward by the opponents of the measure. We think Mr. Ramsdell makes out a strong case, and would fain believe his contribution to the literature of the Commission proposition will in a short time exert a sensible influence in quickening the fruition of a policy which, sooner or later, must be adopted by those whose money is invested in gas undertakings.

The New Business Offices of the Columbus (Ohio) Gas Company.

The third Vice-President of the American Gas Light Association, Mr. Emerson McMillin, and his able adjutant (who is also Secretary of the Ohio Gas Light Association), Mr. Irwin Butterworth, give us authority to say that when the gas men visit Columbus hereafter their entertainers will not have cause to apologize for scantiness of office accommodation or lack of facility for administering to the comfort of the visitors. The new deal appears to be something of this nature. The old office building, at No. 13½ East State street, has been abandoned—the executive and business headquarters of the Columbus Gas Company were maintained there for 36 years—and a new structure, located at Long and Front streets, in the same square as that which contains the manufacturing and storage plant of the Company, replaces it. The new building is a handsome two story structure of brick, with terra cotta finishing, and has a dimension of 45 by 72 feet. It is well lighted and ventilated. The main or Front street entrance leads to a commodious apartment furnished on one side with chairs for the use of the public, who are separated from the clerical force—cashiers, bookkeepers, etc.—by an elegant and artistic method of banking room equipment. But why make "Mac's." neighbors envious by the recital of minute details; hence let it go upon record, for such is the fact, that the floor contains every provision needed for the transaction of the executive business of a live, go-ahead gas company, and for the comfort of those who are to transact it. The second floor, elegantly fitted up in hard wood finish, is divided into two suites of rooms for the accommodation of the families of the Superintendent of works and his assistant. We are indebted to Mr. Butterworth for a set of photographic views of the works, office, etc., and these illustrate quite plainly how the Columbus Gas Company thrives and spreads. The photographs, which are the work of Chas. Butterworth, of Wilmington, Ohio—he is a brother of "Mac's." Superintendent of the Columbus Works—have been awarded a place of honor in our "picture gallery," and several of our visitors, after critical examination of the set in general, and of the plate showing the new office in particular, have decided that "Mac." is becoming rather æsthetic in his architectural fancies.

[OFFICIAL REPORT.—Continued from page 265.]

Fourteenth Annual Meeting of the American Gas Light Association.

HELD AT THE ACADEMY OF MUSIC, PHILA., PA., OCT. 20, 21, AND 22, 1886.

FIRST DAY—MORNING SESSION—WEDNESDAY, OCT. 20.

FURTHER REFERENCE TO THE MATTER OF THE GAS APPLIANCES EXHIBITION.

Mr. Nettleton remarked that the report of the Committee on proposed exhibition recommended that the matter of a future exhibition be given in charge of a special committee, and then moved that the subject be referred back to the original committee.

Mr. Littlehales suggested that the proposition be held in abeyance, or until the place for holding next annual meeting be selected. He thought if, for instance, New York city should be chosen it would be more advisable to have the committee consist of New York residents.

Mr. Nettleton, concurring in the views expressed by Mr. Littlehales, offered a substitute motion which empowered the Chairman to appoint a special committee to take charge of the matter of a proposed exhibition of gas appliances, the committee to be named any time after the place for holding the next annual meeting had been settled upon. Agreed to.

The President here introduced Mr. R. B. Taber, of New Bedford, Mass., who read the following paper on

CONDENSATION.

When Citizen Napoleon Bonaparte as First Consul had been installed in the Palace of the Bourbons, after the completion of the ceremonies, turning to his private secretary he said: "Sir, we are now here; the difficulty is to remain."

In your audience hall to-day I too recognize the need of a *plebiscite* of your good will in the consideration of an old subject, but an extremely interesting one—the control and curbing of the immensely powerful energies developed in the distillation. And if I tread hastily on rudimentary ground unworthy of your time, I hope to atone for my error by provoking a discussion which shall make possible the next step after regenerative distillation—a true method of fractional condensation.

The condensation of gas, as understood generally, has for its object the cooling of the gas, the deposit of volatile matters, and the elimination of such hydrocarbons as are noxious to the illuminating power. The development process is over, the distillation of the coal has proceeded with its intense heat, however imperfectly, and now from this mass there must be saved whatever is of value in the reduction of temperature.

The problem is difficult and extremely complex, since it combines mechanical and chemical energy, and has to deal with gases of intense energy. Of the 29 per cent. of the products of the ton of coal rendered volatile or gaseous 15 per cent. are gases—13 in number; the balance, numbering nearly 40 more, with boiling points varying from 17° C. to 370° C., differing *inter se* in vapor, density, and latent heat, all the while possessing a strong chemical affinity for each other. If, now, we add to this mass constant changes in volume, varying every minute in the lifetime of the charge, varying velocity at varying temperatures—here always a "means of motion"—we have a conception of the state of "fierce unrest" developed in the mouthpiece. And from this is to be deposited, deprived of its heat and noxious elements, an inert gas in the gasholders, as far as practicable made proof against all future changes. For all this the time allowed is less than two minutes; and this is condensation.

In this hurry one almost detects a trace of sarcasm in the by-law propounded that all condensation should take place slowly and successively, and never violently. We will take the law for what it means, however, relatively if not absolutely, and detect the apparent adaptation of it in the gasholder used with a diaphragm, as at the South Metropolitan works of London, and the various ideas of hot condensers in this country.

This law is founded upon the double nature of the process of condensation—the chemical one of the deprivation of heat, and the mechanical one of the deposition of suspended matter—both interwoven, since the gases are saturated chemically, at the same time brushing away in the velocity of the current little globules of imperfectly distilled matter, to be deposited later on as occasion serves. And this chemical condensation is to cool and conserve; for the expression of M. Servier, in his foot-note to Herr Schilling's book on Gas Management, "*Condenser nest pas refroidir*," adds, "This principle of conservation of the illuminating benzine, which contains 65 per cent. of the total lighting power, develops the second law—viz., elimination of all heavy tars while hot from the gas, allowing a contact for only such a period as shall allow all the benzines to be separated."

If we knew, then, more of the nature of the atoms of the mass and their subsequent behavior, the temperature and time of contact might be definitely determined. The experiment has been tried both in this country and

abroad, in what was recorded as one of the successes of the year 1881, in the annual editorial review of the *Journal of Gas Lighting*. To-day this subject lies in a state of "innocuous desuetude," and most of the published reports are afraid to say whether it increased the candle power or not, and whether naphthaline was removed or not. Few attempts were recorded at that time giving strict thermometric readings, and although Young in the shale and Greville in the laboratory, with many French writers, were unanimous in the theoretic advantage, there had been no resuscitation of the subject until the prize dissertation of M. Guéguen, and the report of the Committee of the City of Paris, in 1885, on what might be considered a progress in the manufacture of gas, bring to light further attempts in this direction.

But the fact remains, from the figures furnished in the 1885 report to the Paris Gas Company, that a normal coal distills, to the 100 kilos., 40 grammes of benzole—representing 7 per cent. of its weight and 1 per cent. of its volume. In an interesting article, by M. Greville, on the available amount of light naphtha which the gas has at its disposal, he would add from the stock tars one candle power, and agrees generally with other writers that one-third to one-quarter of the candle power is lost by imperfect condensation, through the chemical affinity of light and heavy tars. Another fact, extremely interesting, since it throws light on what may yet open a *terra incognita*, is the varying amount of benzine formed in the different parts of the charge, increasing over 10 per cent. in the last third of its life—an increase which I fear is mostly lost in the cooler stand-pipe and cold hydraulic main, especially such as are quoted as sometimes standing at 45° C. or lower.

Turning hastily, now, for a moment to the question of temperature, I am surprised at its extreme velocity of operation. A single trial of the temperature of the stand-pipe, taken at short intervals during the burning off of a charge in the New Bedford works, showed a range of fall of 210° C. (376° F.) in the single charge, or 270° C. (486° F.) between its maximum and that of the hydraulic main not 12 feet distant.* It were quite worthy of special study, this first beginning of condensation; the gas issuing, say, at from 400° to 500° C. from the retorts, and falling immediately in the mouthpiece and standpipe, variously depositing its distillate, and redistilling—a sort of irregular fractional distillation going on in a 6-inch stand-pipe. In fact it is here that M. Greville has suggested such enlargement of the stand-pipe that the free hydrogen may have time to seize upon the carbons at their high heats and form illuminating products—a theory never put in practice, as far as I know. M. Greville says: "By the employment of large vessels in which the reduced velocity of the gas would allow time for the heavy particles of tar to settle, and by subsequent use of some system of straining, the tar will be separated at the same time that the temperature will be high, to permit the almost complete retention of light."

This heat maximum, too, in the stand-pipe precedes both the maximum candle power and the maximum yield of gas, seemingly independent of both, since the loss of heat is thence constant to the end of the charge. The loss of temperature of the stand-pipe was evident on cleaning it, since it was found that the pitch at top and bottom was of very different character, melting above 150° C. near the mouthpiece; at the middle of the pipe at 100° C.; and at the top at 45° C.—clearly showing the different extent of the distillation.

In the hydraulic main, while the temperature responds feebly to that of the stand-pipe—say, varying 4 per cent. in the charge—it appears to be influenced wholly by the heat of the stack, being lowest for one fire, and ranging, according to the figures of Mr. Cornuault, from 40° to 90° C. My own observations prove a range from 74° to 86° C. In what way has this heat been lost? Much, doubtless, by contact of vapors with the cold sides of the standpipe; more, perhaps, absorbed as latent heat in the vapor of water. The gases themselves have shown its inability to carry heat, since its temperature at the exit of the retort is so low compared with the retort itself. But this watery vapor, deranging as it does all the boiling points, makes it extremely probable that the minimum temperature of the standpipe (140° C.) will cause all the hydrocarbons (even those of very high boiling points) to condense and diffuse themselves in the gas, while from the easy solution of naphthaline in hot water it affords a ready means of exit for this perpetual pest.

It is highly probable, then, that at a temperature slightly below the boiling point of water, say 90° C., all the benzines can be freed, and as much as possible of the naphthaline and heavy tars be dropped to advantage in the tar well. In fact, Greville finds only traces of light naphtha in the hydraulic main at a temperature rising 60° C., and 1.2 per cent. at the end of a pipe where the temperature had fallen 15 per cent. In a proper hydraulic main, then, kept away from deposited tars by a water cover, at this temperature the chemical condensation appears finished—at least in so far as it assumes the principal role; and now, by the turn of the exhauster wheel, a new series of energy begins. Hitherto the gas has been kept at a vacuum, or nearly so—a fact commented on as a powerful auxiliary for saturation by light oils; but now the gases are quickly compressed, and a shower of tar falls as the rain from a warm cloud compressed by the cold.

Right here I would place one of the St. John & Rockwell apparatus, or a Pelouze & Audouin condenser, which by immediate contact, or differential pressure, squeezes out all the heavy oils, or the greater part of them, before a prolonged contact at lower temperatures is made. A Pelouze & Audouin condenser is capable of regulation to the make, and is amply able to take out all the oils—in fact, admirably adapted to the exigencies of the occasion. In the last year at New Bedford such an apparatus, working with 0.8 of an inch differential, has amply taken care of 80,000 cubic feet per day, leaving not 10 gallons of tar to be deposited in the air condensers. Much vapor of water is deposited in the subsequent condensation, and with it much naphthaline; but, as abundantly capable of doing all the work required of them, the P. & A. instruments are a success.

Without these shock condensers the work is performed mostly by a dilatory process—sometimes controllable, other times not—under pressure, reducing the temperature to that of the air, and preferably a little less. No part of the whole process demands more care than this. M. Greville finds in the condenser and washer tar 7.6 and 13 per cent. respectively of benzine—enough almost to pay a dividend on a $1.25 basis. With stock and gas alike, the heroic remedy must be the better assimilation of the cold waters; the final end of condensation being at that point, be it in the holders or lamp-posts, where the atmosphere has no further action upon it—a point of course varying with the seasons.

Thus below the temperature of 60° to 80° C. mechanical condensation works by compression, or by exposure to a prolonged slower-speeded contact. The operation is now wholly by gravitation acting as the tension decreases through cooling against the sides of the apparatus; and since the volume of incondensable vapors now has become largely in excess of the other, the speed should be greatly reduced to enable gravity to work and gather the yet remaining tarry globules of light tars and watery vapors. If Berthelot is correct, with them should be deposited the naphthaline, or most of it; and I venture to say that, were this condensation sufficiently and slowly performed, much of the loss in candle power might be saved. It would be necessary, however, to avoid all sudden changes of temperature and all exposure to contact of gas and tar—the whole apparatus being under constant control.

I assume, then, (1st) that chemical and mechanical condensation are relatively paramount in their working on both sides of the temperature of 60° to 80° C., and that this point should probably be found in the end of the hydraulic main or shock condenser; and (2d) that while 94 per cent. of the benzines already exist in the gas, and 6 per cent. only are lost, it were worth while to try to save such of that 6 per cent. as can be saved—for if its value is one candle it is worth 50 gallons of naphtha to every 150,000 cubic feet of gas, which is about its equivalent in candle power; and (3d) that our standpipes are badly designed for the delicate process of fractional distillation.

But these assumptions are put forth very cautiously, since many who have had experience in these things have perhaps solved the problem in practical ways. Doubtless more might be achieved by a more perfect distillation. There would seem to be a mine in the possibility of gaseous reactions which would increase the amounts of both the gases and the illuminating powers; but my subject treats mainly of their conservation and elimination. The implied sarcasm of the Paris Gas Company falls flat when it answers that the volume of tar in the gas is so relatively small as to show the full value of the danger of the contact between them. It is not a question of relative values at all; in fact this answer is as lame as the other—that the tar needed some benzines to liquefy it. The subject is worthy of deep thought. It is true that successful results have hitherto been rare, but it is no less true they will surely follow; and I shall be glad if I have served as one of the pioneer corps in laying a plank upon the pontoon bridge.

The condensation must take place at a temperature which shall deposit as much of the naphthalines in solution as possible, and preserve the benzines intact—a solution rendered impossible in its entirety. Since their boiling points overlap, would it not be possible to make the enriching process follow instead of being coeval with the distillation? It is certainly no more chimerical than the contrary process, wholly wrong in principle, of deluging the gas with cold water in a so-called washer. The water gas systems of New York city remove any danger of lack of fixity of the gases thus proposed to be added by a subsequent exposure in heated benches. It is found that the

* The following is the record of the experiment, Aug. 30, 1886: Commencing at the middle of the charge, at 1:30 P.M., the following temperatures were noted on a thermometer with bulb inserted in stand-pipe—

1:38.....204 deg. C.	3:40.....254 deg. C.	4:25.....275 deg. C.
1:45.....196 "	3:45.....284 "	4:30.....260 "
1:49.....190 "	3:47.....304 "	4:50.....248 "
1:51.....188 "	3:49.....325 "	5:10.....236 "
2:11.....178 "	3:50.....329 "	5:20..... 233 "
2:30.....155 "	3:52.....340 "	5:30.....215 "
3:00.....152 "	4:00.....340 "	5:50.....188 "
3:30.....140 "	4:10.....320 "	6:00.....180 "
Charge.	4:20.....275 "	

ratio of development of candle power is greater if naphtha is applied in a Granger superheater to the coal gas after condensation than in any other method of enriching by naphtha. But in whatever way it may be found practicable, I think there can be no doubt that a plan of subsequent enrichment may prove profitable, either in the distillation of tars already carried down or of enrichers subsequently added. I close by throwing out this suggestion, quoting as support the opinion in the report of the Paris Municipal Committee:

"A succession of fractional condensations following hot condensation may be considered as a formula of a perfect condensation."

Discussion.

Mr. Greenough—Did Mr. Taber have much naphthaline in the pipes of his works?

Mr. Taber—There was no apparent increase of naphthaline, except in the pipes of the air condenser, which were filled with it. It is absorbed, as I understand it, by the light tar in the air condenser.

Mr. McMillin—I wish Mr. Taber would describe the apparatus with which he took the temperatures.

Mr. Taber—I inserted a thermometer in the stand-pipe, the thermometer being placed or held at some distance beyond the center of the pipe. My object was to avoid if possible anything which would prevent me from securing a fair estimate of the temperature of the rising gas. Of course, the temperature figures were more or less affected by the deposition of tar on the bulb of the thermometer. As far as possible the temperature was, so to speak, insulated from the temperature of the iron of the stand-pipes.

Mr. McMillin—According to my experience it occurred to me that possibly your temperature figures were somewhat affected by radiation from the front walls, or by the deposition on the bulb of the thermometer; but you seem to have taken all possible care. I regret you did not employ the Fahrenheit instead of the Centigrade scale, so the members would be able to understand you quickly.

Mr. Greenough—I asked the question about Mr. Taber's experience in the deposition of naphthaline because I think such deposit has, in many cases, resulted from the use of the particular form of condenser mentioned. The paper is a very interesting one. This matter of condensation is most important, and something by no means yet well understood. I do not comprehend why the use of this condenser, in extracting the heavy tar, should cause a greater deposition of naphthaline in other pipes of a works; but I think unquestionably that has been the experience in many cases. It is possible some small detail was omitted, and that we may be able to correct the omission hereafter. I know there are gentlemen present who, after introducing that form of condenser, suffered very much from the deposition of naphthaline.

Mr. Clark—I believe the greater deposition of naphthaline after such condensation is ordinarily attributed to the fact that the tar, being taken out hot, has no chance for the absorption of naphthaline.

Mr. Littlehales—As far as Mr. Taber's experience in this matter is concerned, how did he find his candle power affected by the use of the P. & A. condenser?

Mr. Taber—Perhaps Mr. Wood, our Superintendent, can answer that question.

Mr. Gideon Wood—In our use of the condenser we found that the gas passing the purifier would, under certain circumstances, carry tar with it. On one occasion when the condenser was running at low pressure, say eight-tenths, and our make of gas was increasing rapidly, the tar trouble was pretty bad. Consumers complained that their fixtures were all choked up. We increased the pressure on the condenser to twelve-tenths, and the tar trouble was abated, but the photometer showed a shrinkage in illuminating power of from 0.25 to 0.50 of a candle.

Mr. Littlehales—Of course, it is generally understood that an increase in illuminating power follows the extraction of the light hydrocarbons from the tar. I remember, at our Pittsburgh meeting (1882), Mr. McElroy showed us a plan which he had for doing that. If I remember aright he passed the tar through a chamber fitted with coils of hot pipe. I would like to ask him whether he still continues the practice with advantage?

Mr. McElroy—I am still using the method Mr. Littlehales speaks of.

Mr. Taber—I might perhaps say that the tar which passed out at New Bedford did not seem to be a pure tar. It carried no oil apparently; or at any rate the oil was very light. It had a large percentage of blackish carbon. I remember one afternoon the thermometer at the P. & A. condenser was at 140° F., and the passing gas showed tar. The candle power, as shown by the photometer, was 18. We reduced the temperature to 116° F., and the illuminating power dropped to 17, and the tar disappeared. I beg to be excused for having employed the Centigrade scale, but as my paper was founded upon a report made to the Municipal Council, of Paris, I involuntarily used the Centigrade system.

Mr. Stedman—I certainly think any investigation in the direction indicated by this paper must result in very great advantage to the Association. We know too little about the positive facts in regard to condensation. Some member of this Association once suggested that what was true in the case of certain operations in one gas works was very often directly the reverse of the experience gained in another plant. It seems to me we ought not to be satisfied with such a statement. Of course, there are always physical causes for physical effects; and we ought to know, by close investigation, to what causes the different experiences in the various works may be traced. We at Newport, R. I., have just moved our plant to the opposite side of the street from where its old location—altogether a wrong one—was, and in rebuilding we have taken advantage of every experience gained in the old location—we had a pretty fair experience there, too. We desired to avoid every difficulty formerly encountered. In fact we wished to be so thorough in our new construction that our pipes would never have to be uncovered for the purpose of dislodging an obstruction, and so on. For instance, we run off the tar in the hydraulic main by gravitation. That, and all such things, we rather confidently expected to accomplish in the light of what we had learned by experience, and from the theories advanced and the experience gained by others. Well, we found that things did not work as they were laid down in the books to work. We encountered various obstacles in the new order which were entirely unexpected. Among other things we had quite a development of naphthaline which we had confidently expected to avoid altogether, and had arranged our condensation with an especial view to rid us of it. We had the bottom of our hydraulic main slanted in order to avoid, as one of our Rhode Island men said he had avoided, "Pitch in the main by pitching the main." (Laughter.) The result was not wholly as we had anticipated. We thought we had arranged to run the tar out and let the water remain, but we ran foul of an obstacle in the shape of a deposit of light soot in the main, which after awhile accumulated so that it would not run. We found some advantage in leaving the tar in the main in order that the soot might be absorbed and carried off by the tar, as the water did not have any effect in carrying it off. We found ourselves lacking in positive knowledge about the proper rapidity of condensation, and how soon we ought to bring the gas down, in its travel through the condensing pipes, to a proper temperature to be measured and to go into the holder. That seems to be still a mooted question. We have a deposit when cooling by gradual condensation, and also have a deposit of naphthaline when we interpose between the hydraulic main and the condenser a hot scrubber which absolutely raises the temperature of the gas some 50° or 60°, after it reached the hot scrubber and until it passed through it. We had a variable experience with the hot scrubber—which we did not remove from the old works—and which could not be accounted for except on the ground that we used different kinds of coal. Sometimes we had an evident increase of candle power by simply using a coil of pipe in the hot scrubber; but at another time the increase was so very small that it was almost inappreciable. We used that hot scrubber without steam and with steam, and cut it off altogether; but a very careful observation of the different conditions did not seem to give any satisfactory reason why the gas would sometimes be better than it was at others. There ought to be some way well understood by this time that would rid us of naphthaline; and I think we ought to be in a position to say whether the gas ought to be cooled with tolerable rapidity, or whether it ought to be cooled by various low stages—and this should be known to the fraction of a degree or a foot in regard to temperature or length of pipe and surface. We certainly are not in accord on that point yet; therefore I hail with much gratification any experiment in the line indicated by the paper just read—and that is the reason why I believe Mr. Taber is entitled to the thanks of the Association.

A vote of thanks was tendered to Mr. Taber. The Association ordered a recess, to terminate at 2 P.M.

FIRST DAY—AFTERNOON SESSION.

The afternoon session having commenced, the President called upon Mr. Fred. W. Floyd, of New York city, to read his paper, entitled

THE HYDRAULIC MAIN.

In selecting this subject my intention is merely to present a few points in regard to construction, which, although not new, but being brought together in this way, may be of use in designing new work.

The hydraulic main was invented by Samuel Clegg, in 1811, following Lavoisier's invention of the gasholder, and both of these apparatus apply the principle of the pneumatic trough, of Dr. Priestley, the discoverer of the most important of all gases—oxygen.

Its object is that of a valve, to shut off the g s as it is produced, so that it cannot return to the retort. It was first made square or oblong in section, and then circular, flattened on top to receive the dip-pipes, and finally assumed the section now generally known as the **U**-shaped hydraulic main. This is the proper theoretical form, because it requires a smaller amount of liquid to maintain the seal, and allows a greater area for the gas. The gas

capacity of the main should be considerably more than that of the stand-pipes, in order to allow the gas to pass freely and without being in itself a cause of back pressure. The quantity of liquor carried in the main will vary with the means adopted to remove the tar and other condensed products, but should be a minimum volume, the object being to remove these from the heat of the bench and the action of the gas as soon as possible.

Position.—The main is placed ordinarily about 12 inches from the top of the bench, but the custom now prevalent is to lessen the amount of radiated heat by raising the main from 2 to 3 feet. The lengthening of the stand-pipes is a serious matter, and I am of the opinion that more than 2 feet is not good practice, except in special cases where the weight of the liquid is used to force the tar from the main, when the extra condensing surface in the stand-pipe may counterbalance some of the disadvantages due to stoppages and first expen e.

The main should be supported, independently of the brickwork, on adjustable mainstands, resting either on brackets secured to the front buckstaves, or on transverse beams extending from front to rear buckstaves. In long mains particularly it is the only way in which the flanged joints can be protected and the main kept level so that the dip-pipes shall all retain the same seal.

In order to shorten the span of the bridge-pipe the main should be set as near the front of the bench as possible; and as many engineers prefer to place the center of the stand-pipe 9 or 10 inches from the bench, the dip-pipe can come forward, and enter near the front of the main, instead of at the center, as usual.

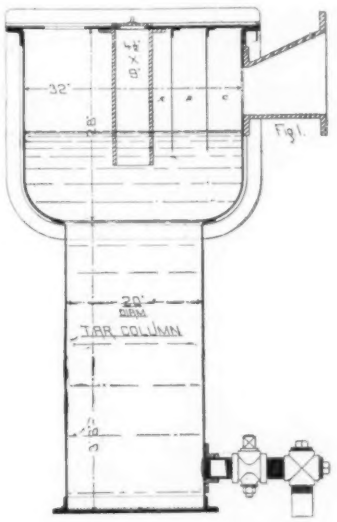

Fig. 1.

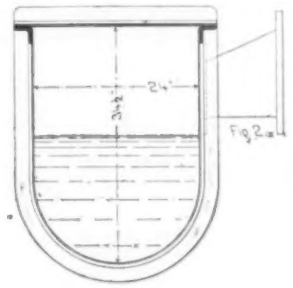

Fig. 2.

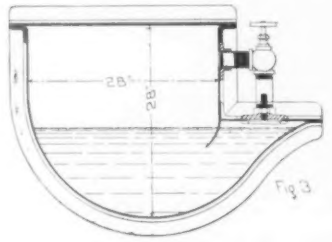

Fig. 3.

As the construction of the bridge and dip-pipes has much to do with the working of the main, I would recommend that the bridge-pipe be fitted with a self-sealing lid, or that its stopper should fit into a hub or shoulder to prevent the dropping of luting into the main, which forms a hillock below the dip-pipe, about which the tar accumulates and hardens. Also, that the dip-pipe be provided with slots at the end to lessen the oscillation of the liquid which, it has been stated, is one cause of the deposition of carbon in the retorts.

Material.—With the size, shape and position of the hydraulic main determined, the question arises whether it shall be made of wrought or cast iron. I favor wrought iron, for several reasons: 1st.—Its weight is about one-half that of a cast iron vessel; 2d, its surface offers less resistance to the flow of tar; 3d, from what I can learn it will last fully as long as cast iron.

Its cost, for an ordinary main, is about the same as that of cast iron; while, for the special forms of mains, on account of the cost for patterns, the great weight, and the difficulty of casting, wrought iron becomes completely master of the field.

Special forms.—The improvements in the hydraulic main have been chiefly made in two directions: 1st, to allow of access to the main for the purpose of cleaning the same when choked by tar or pitch; 2d, the adoption of some plan by which the tar could be removed, if possible, before it had time to harden.

For the first object the section with a pocket at the back of the main (shown in fig. 3) appears to be the best plan. By closing the small pipe connection between the main and the rear chamber, used to equalize the pressure, the latter can be operated and the main cleaned without stopping the operation of making gas.

For drawing off the tar from the bottom of the main two plans that are in successful operation can be mentioned—one by the Kloenne system (fig. 1), in which the tar is drawn off at stated intervals from the 20-inch tar well at the bottom of each main. The other, by the use of the Stiness' main* (fig. 2), and the Hutchinson apparatus which has been so clearly described by Mr. Stiness.

Want of time has prevented any discussion of the use of scrubbing material in the main, and the various means for bye-passing the seal; but I think the three sections here shown indicate the best starting points for further improvements.

Discussion.

Mr. Nettleton—I think Mr. Floyd is in error in one of the minor points in his paper, where he recommends serrating the bottom of the dip-pipes to overcome as much as possible the oscillations of gas in the retort, thereby preventing the deposition of carbon. I have tried the plan, and failed to find any advantage in it. I am putting up some new mains this year, and had expected to continue the same practice; but the builder suggested to me that in casting the dip-pipes it was utterly impossible to make the serrations of equal depths. There would be a variation, and consequently it would be impossible to maintain a very low seal on that main without the gas coming back in some one of the stand-pipes. By putting the dip-pipes through a lathe the variations in their lengths could be reduced to a sixteenth of an inch, and so long as your seal was in water you would be able to carry a very low seal, which would reduce the pulsations to a minimum. As to a choice of mains, I very much prefer the one devised by Mr. Stiness on account of its good results, and because it seems reasonable to remove the tar at once and as it is made. I am sorry to hear to-day of its want of success in that respect; for I had not supposed it possible that the main would clog up. It seemed to me the only drawback to the Stiness main was the fact that as the tar was drawn out its place was filled with fresh water. As ammonia is becoming of considerable value to some of us, I rigged up a tank, just below the level of the hydraulic main, so that all the ammonia water which condenses in the hydraulic main runs through the tar well at the end into this tank. As the tar is drawn off, leaving the tank on the end of the bench empty, that tank is filled up, not with fresh water, but with ammonia water which has been condensed and collected. I offer that suggestion for what it is worth.

Mr. Greenough—We have been making some experiments in one of our stations with regard to drawing the tar from the bottom of the main, and fitting it up by the Hutchison attachment at the end, which allows the tar to be drawn off at the bottom, and its place taken by fresh water. We have found very great relief from many of the troubles from which we have suffered before, caused by pitch in our main. It is a very simple remedy and works admirably. It certainly is not owing to the use of fresh water. I would like to ask Mr. Floyd whether the Kloenne arrangement shown in the drawing has been a success, so far as he knows. I had an impression that in one place where it had been tried in this country it was not a success.

Mr. Floyd—I believe those who have used it had no difficulty in drawing off the heavy tar from the main. I believe they draw it off once in 24 hours.

Mr. Greenough—What advantage is supposed to be derived from those partitions in the main?

Mr. Floyd—The partitions are so arranged that they are closed at alternate ends; the gas passes successively through the passages A, B, and C.

Mr. Littlehales—It seems to me the drawings, as I understand them, after Mr. Floyd's explanation, are somewhat contradictory. As Mr. Floyd now explains I understand the gas would come in at A, go to one end of the main

* See JOURNAL, XLIV., March 16, 1886, p. 159.

and come back, thus keeping it traveling over the hot tar. In my judgment that is an excellent thing. I think it is now generally considered, by passing the gas over the hot tar you may take from it the ammonia and the lighter hydrocarbons, but that if you pass it over cold tar injury ensues. As I understand Mr. Floyd's statement the object is to draw the tar off at once, whereas the plan which he seems to favor most is to keep it in contact three times the length of the hydraulic main. Is that so?

Mr. Floyd—No; the importance of taking the tar away as rapidly as possible is most urgent in an ordinary main, where there is no other provision for drawing off the heavy tar.

Mr. Littlehales—But, in those two partitions, does the gas not flow backward and forward along the hydraulic main over the hot tar?

Mr. Floyd—Yes, that is the case.

Mr. Stedman—May I be allowed to say one word on this question before the subject is closed, with regard to some remarks made during the discussion, and which seem to me to indicate they were inferences drawn from statements made by me this morning, that I regarded our experience with the Stiness main as indicative of failure; not by any means. I think our experience with it shows it to be an admirable form of main. I only wanted to intimate it was not so absolutely perfect in its workings, and so able to overcome all the difficulties we might encounter, as to cause us to say that vigilance might go to sleep alongside of it with perfect safety. Once in a while incidents connected with its working show it is not absolute master of the situation; and our experience indicates it is not the perfect remedy for stopped stand pipes, for the thickening of the tar in the main, and the dropping of soot down the dip-pipes, that it was originally predicted to be. Perhaps it would be well for me to add that in the Stiness main erected at our works we made a change in the method of removing the tar by inserting a division plate, having an opening at the bottom for the tar, and at the top for the gas, the tar being finally taken off by an ordinary valve.

Election of Officers.

Mr. Stedman, on behalf of the Committee on Nominations, reported the names of the following gentlemen as those nominated to hold office for the ensuing year:

For President.—M. S. Greenough, Boston, Mass.

For Vice-Presidents.—1st, Thomas Turner, Charleston, S. C.; 2d, A. B. Slater, Providence, R. I.; 3d, Emerson McMillin, Columbus, Ohio.

For Secretary and Treasurer.—C. J. R. Humphreys, Lawrence, Mass.

For Finance Committee.—C. H. Nettleton, Birmingham, Conn.; A. E. Boardman, Macon, Ga.; J. D. Thompson, St. Louis, Mo.

For Executive Committee.—J. P. Harbison, Hartford, Conn.; R. R. Dickey, Dayton, Ohio; G. G. Ramsdell, Vincennes, Ind.; Walton Clark, New Orleans, La.; W. H. White, New York city; D. H. Geggie, Quebec, Canada.

On motion, the report of the Committee was accepted, and their recommendations adopted. The President appointed Mr. F. W. Gates to cast the ballot of the Association in favor of the nominees. Messrs. Cabot and Nettleton were named as tellers. The tellers subsequently reported that the nominees had received a unanimous vote; and the President thereupon declared them duly elected to the positions set forth.

Formal Introduction of the President-Elect.

The President-elect, Mr. Malcolm S. Greenough, was escorted to the platform, his appearance thereon being greeted by a burst of applause. President Wood, when quiet was restored, said: Mr. Greenough, I congratulate you most heartily upon your election to the office of President of this Association. Gentlemen of the American Gas Light Association, behold your President for the ensuing year! Mr. Greenough, in response, said: Gentlemen, I think it is hardly expected that any remarks are looked for from me at the present time, except to thank you for the honor you have done me. I shall do my best to try, when the time comes for me to preside over your deliberations, to act as well as the long succession of gentlemen whom I shall follow have done. [Applause.]

Next Place of Meeting.

Capt. W. H. White, on behalf of the Committee to name a place for holding next annual meeting, reported that New York city had been decided upon. The report was accepted and ratified.

To Appoint a Committee of Arrangements.

On motion of Mr. Harbison, the President was empowered to appoint a Committee of Arrangements in connection with the New York city meeting.

Election of Prof. E. G. Love to Honorary Membership.

The President—The Executive Committee having recommended that Prof. E. G. Love, of New York city, be elected to Honorary Membership in this Association, it seems to me this would be an appropriate time to indorse that recommendation. What is the pleasure of the Association in regard thereto?

Mr. Harbison—I move that Secretary Humphreys be instructed to cast the ballot of the Association in favor of the election of Prof. Love to Honorary Membership.

The motion was agreed to. The Secretary cast the ballot in accordance with the instruction given. The Chairman announced the result and declared that Professor Love had been elected to Honorary Membership. The President now called upon Mr. G. G. Ramsdell, of Vincennes, Ind., to read his paper on the subject of—

GAS COMMISSIONS.

Gentlemen of the Association:—I have been very persistently urged by our worthy Secretary to prepare an article on the subject of "Gas Commissions," presumably in support of the majority report* of the Committee appointed by the Western Gas Association to investigate the subject of "Gas Commissions," and whose report was read at the last annual meeting of that body, held at Columbus, Ohio, in May last.

Believing that the important point is to bring the subject before this Convention in some definite form, and believing also that it is immaterial upon which side of the question this paper may array itself, and at the risk of repetition of much that appeared in that report, the following is submitted.

The subject, it is unnecessary to say, is one of the utmost importance, and presses forward now with greater vigor than ever before. If it is right and beneficial, whatever of opposition there is must be met and overcome ere any tangible results follow; and, as stated in the report referred to, the day of consummation is evidently in the future.

Personally, my views, before any extended investigation was made, were favorable; and the failure of other means to effect the purposes germane to the duties of gas commissions has impressed me more and more with the belief of their value and importance.

For many years the history of the gas industry of the country has pointed unmistakably to the necessity of greater security and more stability in values of stocks, and greater permanency in the corporate rights and franchises of gas companies. This is abundantly shown in the efforts that have been made to create some centralization of forces to be used in defence as against all unjust and injurious schemes manipulated by parties solely for self-aggrandizement or malicious persecution. These efforts, though put forth by those possessed of great ability in the ranks of the gas fraternity, have failed, owing to some impractical feature in the plan proposed, and have only crystallized the belief that some measure should be reached which would meet the views of all concerned, and be effective in the consummation of the objects sought. All these movements have emphasized and rendered more conspicuous the state of unrest and desire for something to be brought forward that would afford ample security to vested interests as well as mutually protect producer and consumer.

It would be folly for any one to lay claim to a degree of wisdom competent to produce a plan that would effectually satisfy all the various conditions now existing; but it can safely be said that, by comparing views and basing our actions upon knowledge so gained and knowledge acquired by experience, we may gradually establish a definite plan calculated to develop into that which will at once comprehend and satisfy all the requirements.

All that I have learned in investigating this subject has tended to strengthen my own views that the gas commissions measure, if established and carried forward upon such plans as we are striving for, would meet the necessary requirements. If this be true, it then becomes not so much a question of the desirability of commissions as the construction and operation of them. We do not mean by this that what we seek in a gas commission is relief from competition; nor do we mean by protection that it shall shield us from the competition of other artificial lights. On the contrary, we welcome all healthful competition, for we recognize its value as a stimulus to greater exertion and activity; but we also recognize the fact that very much of this so called competition is falsely defined, and is simply a system of blackmail. Almost invariably whenever alleged competing companies enter established territory the primal cause may easily be traced to its correct source, and as invariably it will be found to be solely for the pecuniary benfit of a few who cloak their designs behind the hue and cry of public beneficence. This cloak soon wears threadbare, and thus its shoddy nature is exposed.

We need no protection other than our just rights; nor do we ask more. We only desire equitable treatment; but we do desire this *before* and not *after* the evil is accomplished!

Communities rarely fail to regret the evils they so flippantly foist upon themselves in the shape of gas legislation, and the trouble lies in the fact that they fail to heed the note of warning at the proper time, but with almost insane suspicion place their confidence in ofttimes public enemies in preference to citizens whose integrity in other matters is established and impregnable. Who of us have not witnessed this repeatedly; in fact, is it not incessantly before us? Follow out the history of the halt and maimed and

*See Journal, current Volume, p. 5.

wrecked gas companies, and see if the pages of history do not almost line for line fit in the same groove. Often the envy of a few good citizens, aided by blatant spoilsmen, will precipitate a "gas war" on a gas company that, because the company embodies too much of honorable dealing in its corporate management to sacrifice its integrity by yielding the "blood money," causes it to suffer, perhaps for years to come, in loss of business and prestige. No other business venture of to-day stands in so helpless a condition for self defence as do the millions invested in gas property, and no line of business with comparable investment, except ours, is not so banded together in combinations as to have at once resources for self defence and aggressive warfare. Experience has taught capital the wisdom of unity; and as a result greater stability exists in all the other branches of trade. We are often at the mercy of the spoilsman; subject to unjust taxation and legislation; and very rarely is the public a just arbitrator upon short notice. There must be a tangible cause for all this; what is it?

I believe one cause above all others is the almost utter lack of knowledge of our business on the part of the public, and that this would be remedied by the operation of competent commissions more through the publicity of our reports than otherwise. It may be asked, Why not publish our reports without having gas commissions? The reason is obvious. The very first duty of gas commissions would be to readjust, if necessary, the corporate affairs of all companies in the State, thus placing all on an equality as to capital and profit, thereby removing the great obstacle to this mooted question, and at the same stroke removing the unreasonable prejudice against our industry which exists in the minds of so many persons. This is but one point, but, to my mind, the most important of all—embracing all.

Let us briefly consider what we desire in a commission; and to more fully illustrate it let us suppose, as a hypothetical case, that the public should appoint a committee to represent them, that this Convention appoint a similar committee to represent the gas companies, and that these committees should meet together and formulate requirements such as they consider necessary to satisfy the interests each represents. Let us try to see how these reports would look and sound. We will suppose the gas committee reports as follows:

What we (the gas companies) require is—

1st. An equitable capitalization.

2d. An equitable allowance of distributive profits.

3d. An equitable allowance of cumulative profits, embracing reserve and surplus.

4th. An equitable adjustment of prices per thousand cubic feet, based upon the above tenets.

5th. A sliding scale that will prove an incentive to greater effort on the part of gas managers, by increasing the measure of distributive profit in proportion to the advantages accruing to the consumer in cheaper rates.

6th. Perfect security against so-called competition, when all the conditions are fulfilled.

We will suppose the other committee (the consumers) to report as follows:

What the public require is—

1st. An equitable capitalization.

2d. The prohibition of the issue of bonds or increase of capital stock except for actual increase of plant.

3d. Complete returns showing the business, in detail, of each company, and the publishing of annual reports.

4th. An equitable allowance of distributive profits.

5th. An equitable allowance of cumulative profits.

6th. An equitable adjustment of prices per thousand cubic feet, based upon the above tenets.

7th. A simpler mode of measurement.

8th. Perfect security against so-called competition, when all the conditions are fulfilled.

If this does not impress you with its impartiality I have failed in my effort, but have done so from a failure to thoroughly divorce myself from my calling. At any rate, they are based upon the belief that what we are seeking for is, in equal measure, what the public desires.

It is at once apparent that the requirements are very much alike; but does not their value lie in their mutuality, or upon the principle that in our business that which inures to the benefit of our consumers is alike of advantage to us?

It is not only unwise but unsafe for gas companies to do or countenance acts in their corporate capacity that are dishonest to the public, with which they are so closely interwoven; and though a few may be pecuniarily benefited by some unjust act or acts, brought about by dishonest means, yet the public, as well as the shareholder, participate finally in the costly results. We have had but a brief experience in this country with legal control; but, judging from an extensive correspondence on the subject with the gas managers of Massachusetts, it is in eminently successful operation in that State. This fact conclusively shows that, under like circumstances, commissions may be formed and set in operation in other States; in fact, the combined influence, in almost any State, of those interested in gas stocks, if properly concentrated, can so affect legislation as to secure practically the measure desired—if that measure is equitable and just.

Admitting the desirability of commissions, let us consider some of their advantages.

1st. It would at once give a fixed value to all gas property, in establishing certain rules of capitalization and profit.

2d. It would establish prices in accordance with surrounding circumstances, and not upon a basis which ever contemplates a margin as a war contingent, by establishing perfect security from blackmailing schemes.

In the matter of capitalization, it is well known that a very large proportion of companies are capitalized with scarcely a regard for the actual value of their plant; and we are all more or less familiar with the difficulty of adjusting capital. In the hands of a gas commission this difficulty would disappear—for the capital being based upon some such standard as the output, it follows that the company concerned could only declare its allowed rate of profits on the capital so determined.

The question of the adjustment of capital has for years been fraught with dangerous elements. In recent years, under the growing custom of basing capital upon its earning power, millions of dollars of watered stocks have been foisted upon the public, which have at the time of emission, owing to unusual business prosperity, been able to pay a promising profit, but which subsequently became burdensome under an era of depression and consequent lower prices.

Gas stock has, as yet, only to a limited extent entered into this system of inflation; but many companies are burdened with a load of capital that in time of reverses renders their stock so nearly valueless that the untoward influence is felt for years in subsequent valuation. Besides, we are now in the midst of business prosperity, and an era of lower prices in gas rates, and hundreds of companies could lower their selling rates, and thereby largely increase and otherwise improve their business, but are held back by a fear of diminished dividends. Again, many companies whose capital has remained unchanged through years, while the output, plant and profits have increased favorably, find it unsafe to let their amounts of profit disbursement be known.

In the larger cities these things are easily righted, but the vast majority of gas companies are located in the smaller cities, where contact with the public is closer, and where any movement in capital is regarded at once with suspicion.

As to the allowance of profit, it is not the province of this paper to say what these figures should be; but the allowance should contemplate a fair return upon the money invested, a sufficient compensation, to cover the hazardous nature of the business, embraced in a cumulative profit, and an additional per cent., comprehended in the English sliding scale, as an incentive towards cheaper manufacture. The minority report and nearly all of the developed opposition to commissions as well, is based upon a lack of confidence in the integrity of the same. This, with some allusion to the tax it would impose upon the manufacture, in fact form the basis of the negative argument. This is shown in the report spoken of, and is confirmed by the correspondence upon which the majority report is based. It would be unwise to ignore these features, or to pass them unanswered. In the consideration of this subject it is quite natural to form our opinion very largely, if not entirely, upon its feasibility in our respective States; and if, in our opinion, the State in which our business is located is such that it would seem unwise to undertake the work of securing a commission we find ourselves opposing it.

I am of the opinion that all the States are not equally ready for commissions—that in some it would be useless and unwise to attempt their formation for causes peculiar to those States. For instance, some States have so few companies located within their boundaries that the expenses entailed by commissions would be actually burdensome. Again, in others local conditions exist that would seem to indicate greater success if the project was deferred until these commissions had been successfully operated in neighboring States. These are, however, only suggestions that would have to be met and duly considered on their own part by the companies located in such States.

Again, commissions having been formed, under what we term favorable circumstances, is there danger of a reversal of the conditions to an extent sufficient to cause harmful results? The answer to this can but be the record of one opinion. You may think one way and I another; and after all at best it is scarcely more than conjecture; yet I believe most firmly that it depends entirely upon the integrity of the State. We do not expect a reversal of the conditions in Massachusetts. Why? Because we believe in the stability of the State and of its affairs. To say that our own State is less stable is to pay a tribute to her. As communities, as States, and as a nation, we are blessed with a saving common sense. Great wrongs do not long go unrighted, and with a just cause we have little to fear. Convince the public of our own in-

tegrity, and we are assured their support. Besides, are we running less risk to remain as we are? In how many States is there now not some lawmaker, posing as a public benefactor, who threatens our industry with legislation—unwise and not only unjust to us, but equally so to our patrons, but none the less a penalty on our prosperity. Indeed it seems to me one of the strongest arguments that can be made in favor of commissions is to call attention to the fact that there is so much legislative activity in many of our States. Legislation, often unjustly affecting our business, is easily pushed through, and is rarely estopped save by some combination of effort. And at best perhaps the scheme then is not stopped, being simply modified as to some of its features, and in this compromised form it goes upon the statute book as a burden upon the capital invested in the State. We all know that these matters are difficult to impede or control. Experience is teaching us that gradually we are approaching legislative control; that each year produces its quota of enactments bearing upon gas matters; that very few of these are of benefit to consumer or producer; that when the effort of honest men they are nearly always born of a suspicion caused by an absolute ignorance of our business; that these laws, whether advanced by worthy or unworthy motives, are almost invariably annoying, pernicious and costly to gas companies, and, in very many cases, very closely resembling blackmail.

It thus becomes a question whether we shall, by placing ourselves in the hands of gas commissions, secure benefits equivalent to the restrictions imposed.

(To be continued.)

Electric Light Dangers.

At a meeting of the New York Electric Club, held in this city on the evening of November 4th, Dr. Geo. H. Benjamin presented a paper in which he reviewed some of the perils attendant upon electric lighting installation and supply. The Doctor's arraignment so greatly displeased his listeners that the latter refused to allow the paper to go upon the club's records, and the debate indulged in, to say the least, contained none of the elements consonant with dignity or in accord with harmony. Dr. Benjamin, at the conclusion of the discussion, announced that so long as his fellow members would not grant his paper a place on the records he would cause it to be published in another shape. The New York *Tribune*, date of November 7th, prints the following, which it asserts is what the Doctor read before the Electric Club:

In 1882 the Board of Fire Underwriters of the city of New York adopted a series of rules relative to the precautions to be observed in the introduction of the electric light into buildings, which were published at the time, and with which you all are doubtless familiar.

However well these rules may have been suited to the date of their promulgation, I believe it will be generally admitted that they are unsuited and inadequate to the present needs. With all new industries or the practice of new arts it has been the rule to allow the utmost latitude and to impose as few restrictions as is possible compatible with public welfare; this with the idea of lending encouragement and facilitating the introduction of such new art or industry; but when after a time the industry or art has become well understood and established on a firm commercial basis, further and supplemental restrictions are generally imposed, with the intention of making the employment of such art or industry absolutely safe for all concerned, those engaged in the practice thereof as well as those using being benefited thereby.

When the dangers arising from the employment of electric currents of such quantity or electro-motive force as are required in electric lighting were first pointed out through the medium of the public press, there was a great hue and cry raised by those engaged in the business, and unstinted abuse was heaped upon the heads of the unfortunates who had dared to have the temerity to advance such radical ideas. Time works wonders, and I doubt not that to-day even those employed in the business of electric lighting see and feel the necessity of precautionary rules and likewise the advisability of their most rigid enforcement. If any present see fit to question my premises as stated, I would respectfully refer them to the disastrous fires and terrible accidents which have been lately recorded in the daily press—fires which caused the destruction of large amounts of valuable property, and accidents by which men were unnecessarily deprived of life. I say unnecessarily, as regards life, as the possibility of such slaughter should be guarded against by absolute prohibition, and, if necessary, by statutory enactment making it a penal offense to direct or employ men, however experienced, in that class of electrical work where the slightest oversight or unavoidable slip means sure and instant death.

Some of you may be inclined to argue that employers should not be held responsible for the carelessness and negligence of their men; that the men seek the employment well knowing the terrible dangers to which they will be subjected. To them I say that the root of the matter should be sought. The struggle for existence and the difficulty of obtaining employment at the present time are most potent factors in causing those who need to seek and obtain situations, however great the risk entailed. If the remedy were directed toward the fountain-head, and the principal or management of the company employing such dangerous currents were held personally responsible, then they would make it their business to see that no unnecessary risks were entailed, and they would in effect become guardians of their men.

That familiarity breeds contempt is an old saw, and to warn the average electric light lineman or machine attendant to be careful is sure to provoke a derisive smile. "All right; I'll look out for myself," was the answer of an old and experienced employee in a Western city a few weeks since. In less than two minutes thereafter he was stone-dead. He thought the circuit was open. If the president of the company had been fully aware that he would be held responsible for such an accident he would have seen to it that the circuit was open, and a human life would not have been needlessly sacrificed. Some may argue that there are occasions when it is impossible to open the line without serious loss or public inconvenience, and that repairs may become necessary when the line is in full operation. To those I say that there can no occasion arise in which an employee must necessarily risk his life. What does it matter if one, twenty, fifty, or any number of lights be cut out? Nothing compared to a human life, and particularly as I maintain that no condition can arise where necessity of cutting out any such number of lights is obligatory.

When a man under our laws is tried for his life the law originally presumes him innocent. There are many cases on record where hundreds of thousands of dollars have been expended to save the lives of men probably not as worthy as either of the two poor fellows lately so wantonly slaughtered—more money, yes, twice over, than would have been required to buy out and obliterate the electrical companies owning the plant which caused their death. The good of the many (the public) may at times require the sacrifice of the lives of the few, but the good of an electric light company is not the good of the public, and it is incomprehensible that a mere commercial concern should be allowed by gross carelessness or ignorance to sacrifice the life of even the meanest of human beings.

Therefore I contend that stringent and prohibitory means should be adopted to make such accidents in the future an impossibility; and further, that such rules should have the cordial support of everyone having the true interest of electric lighting or the transmission of power at heart.

So far as the risks from fire are concerned, it is not necessary to enumerate them. Unfortunately sad experience has made them only too well understood. Careless, stupid, and one may say criminally loose methods of wiring have been the rule rather than the exception in this country; of course, with some notable exceptions; and all those who have carefully studied the subject and are conversant with the needs feel that the enforcement of proper and stringent rules will not only allay public fears and restore confidence, but likewise materially benefit the industry.

I contend, gentlemen, that we should look upon this subject in a broad light and free from the narrow prejudice of business. We should recognize the necessity, and not attempt to evade the responsibility. To make an electric plant perfectly safe may necessitate slightly increased cost of construction, although personally I am inclined to doubt the fact. But even admitting such to be the case, the perfect immunity from danger, the decreased cost of insurance, and the general confidence engendered in the public mind will be a good interest upon such additional outlay.

Dr. Benjamin then read a number of proposed regulations and precautionary measures, which, he stated, if adopted by the companies, would obviate in a great measure the evils complained of in his address. These regulations were not reached in the lively discussion which followed.

[Communicated Article.]

The Munich Regenerative Bench.

By F. Mayer.

During a recent journey to Europe I had occasion to visit the gas works at Munich. When there I had an opportunity to make observations and obtain some data in regard to the construction and working of their regenerative furnaces, and I will attempt to here give you my views and conclusions, which I trust will prove to be of some interest.

I did not go into the examination of other furnaces, and for two reasons: 1st. My time was limited; 2d. The Munich bench is, in my opinion, the most successful of the European furnaces in operation—being in use at present in Germany, France, Spain, Italy, England, Russia, Sweden, Denmark, Holland, Austria, and Bulgaria. In many of the above places it has succeeded regenerative benches of cheaper construction, or those with the generator constructed inside of the setting.

I will briefly describe the construction of the bench, by copious reference to the accompanying illustrations. Fig. 1 represents a longitudinal vertical section through the entire bench, including generator. Fig. 2 shows a transverse section through bench and regenerator; and fig. 3 is a transverse ver-

tical section through the generator. The generator, which is closed at the top with a faced lid, is divided into four distinct parts; 1st, the lower part, where steam is generated and the primary air is introduced; 2d, the space between water pan and grate bars, to receive the ashes; 3d, the part that

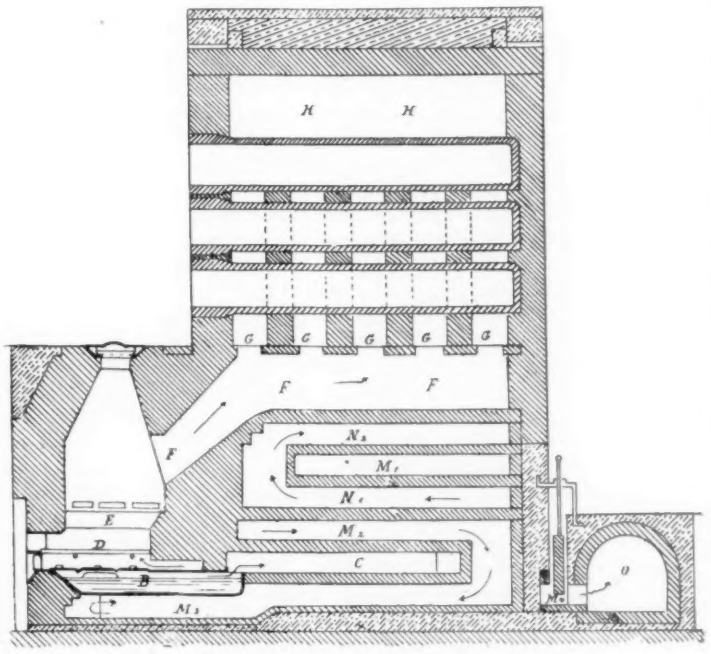

FIG. 1.—LONGITUDINAL SECTION.

contains the fuel, and where the same is gasified; 4th, the part immediately below the charging shute.

The primary air necessary to gasify the coke for the production of carbonic oxide enters on the side of the generator, through the opening *A* (which is provided with a regulating slide), and issues in the generator immediately above the water line in the water pan *B*, where it mixes with the steam arising from the same. The mixture then passes through the channels *C*, C_1, C_2, and C_3, and is warmed by contact with the walls of the adjoining flues, which contain the spent gases. It then returns under the grate *D*, at the back, and ascends through the ashes at *E* to the zone of combustion. The generator gases are conveyed through the channel *F* into the bench at a point where they meet the secondary air, previously heated in the regenerator and issuing through the burner *G*. The products of combustion, *H*, take the course indicated by the arrows, and pass into the regenerator at the back end of the flue *L*, from where they are conveyed through the flues *M*, M_1, M_2, which are situated between the secondary air channels *N*, N_1, N_2, and N_3, and then pass through M_3 to the front, underneath the channels which contain the mixture of primary air and steam. After passing underneath the water pan *B*, to generate steam, they finally escape through M_4 into the flue *O*. The course of the products of combustion is such that they successively impart heat, 1st, to the secondary air; 2d, to the mixture of primary air and steam; and 3d, to generate steam. The course of the mixture of primary air and steam, and that of the secondary air, is opposite in direction to that of the products of combustion—the latter passing downward, whilst the former pass upward. The secondary air enters the generator through the air slides *P* and P_1.

Having thus described the construction of the bench, I will now present some of the most important advantages and results that are claimed for the same above all other furnaces hitherto invented.

An extremely favorable heating gas is produced by the decomposition of steam in the generator, which also prevents the formation of clinker. I could easily push a wrought iron bar one inch square, with my left hand, transversely through the ash space after the generator had been working 30 hours. The steam generated by the products of combustion is equal to from 50 to 70 per cent. of the coke in weight, according to the various qualities of coke used for fuel. The volume of steam generated by the products of combustion is strictly proportional to the amount of fuel in the generator. An increased consumption of fuel will cause a quicker formation of steam, and a corresponding reduction of temperature in the generator, thus creating a sort of automatic compensating action. The heat abstracted from the fuel to decompose the steam is by no means lost to the bench, but is carried into the latter in the form of combustible gases.

By introducing a large quantity of steam at constant rates—which can readily be done in this furnace—the temperature of the generator is kept far below the fusing point of any earthy matters in the fuel, which is deposited upon the grate bars in the form of porous ashes, and offers but little resistance to the penetration of air, even if several inches in thickness. This fact greatly reduces the labor required in the management of the generator. Quite a large amount of coke may be allowed to be consumed in the lower part of the generator without the removal of ashes. In Munich the generators are cleaned once in every 24 to 36 hours. The time required to clean one generator complete is about 30 minutes. It is of the utmost importance to thoroughly mix the air and steam, before the mixture enters the generator, by combining their preliminary heating (by products of combustion) with the other arrangements for generating steam and mixing it with air under the grate bars.

The heat in these benches may be raised to a very high temperature; but this is found to be disadvantageous in practical use, as a production of over 10,000 cubic feet per retort in 24 hours, using retorts $21'' \times 15''$, has caused a considerable number of tarry stoppages in the stand-pipes, which may be followed by the formation of naphthaline. As the introduction of a large quantity of steam keeps the generator at a low temperature, there is but a small amount of radiation, and the wear and tear is reduced to the minimum.

Benches constructed in Munich in 1878 have had no repairs whatever made in the regenerator. The expense for repairs has been confined to the renewal of retorts and the occasional replacing of a few bricks in the generators. Many tests at different periods have given the same results, thus proving that the letting down and reheating of a bench does not injure its construction. All of the wide flues are provided with small perforated piers of fire-brick material, in order to allow a rapid exchange of temperatures, and to cause to be as slight as possible the difference in pressure of the gases that occupy contiguous flues.

An average analysis of many tests of the generator gas shows its composition to be as follows:

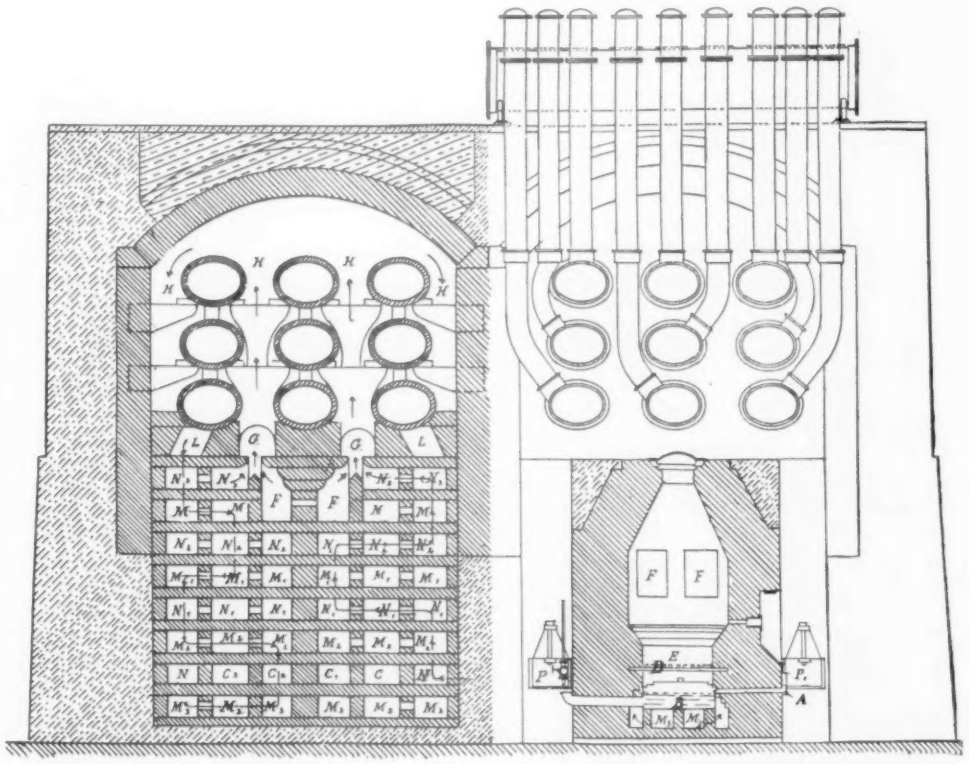

FIG. 2.—CROSS SECTION

FIG. 3.—SECTION THROUGH GENERATOR.

Constituents.	Per cent.
Carbonic acid	8.6
Carbonic oxide	20.6
Hydrogen	15.0
Nitrogen	55.8

The combustible compound enters the setting at an average temperature of 1,150° C. The products of combustion leave the bench at a temperature of about 1,400° C., and consequently enter the regenerator at that figure. After heating the secondary air to from 1,000° to 1,100° C., they still register about 900° C. After imparting a part of their remaining heat to the mixture of air and steam, they enter the flues under the water pan at a temperature of 550°.

The working results in Munich, during the year 1884-85, were as follows:

Total production of gas	9,906,060 cu. meters	= 349,842,000 cu. ft.
Total consumption of coal	31,278.9 tons (net)	= 62,557,800 lbs.
Total production of coke	18,865.9 tons	= 37,731,800 lbs.
Consumption coke in generators	3,014.9 tons	= 6,029,800 lbs.

This shows a consumption of 15.1 per cent. of the coke produced, or 9.6 lbs. to the hundredweight of coal carbonized. Each bench has 8 oval shaped retorts, measuring 15″ × 21″ × 9′. The gas production per bench per diem amounted to 2,150 cu. meters = 75,000 cu. ft., or 9,375 cu. ft. per mouthpiece. Each retort is supplied every four hours with a charge of 260 lbs. of coal.

I have here given you all of the data on the Munich bench in my possession, and hope that these may lead to the construction of the Munich bench on this side of the Atlantic in the near future, so that American engineers may be able to judge practically from their own experience whether or not the Munich bench possesses all the advantages claimed for it.

Gas Lights and Oil Lamps for the Winter.

A commentator, in a recent issue of the London *Journal*, thus addresses himself to a question often discussed in this country. He says:

The approach of the long nights of winter naturally leads householders to think of the means of lighting their dwellings during this season of indoor life; and the opportunity may therefore be taken for making a few observations upon the general subject. It would not be out of place, for one thing, if directors of gas companies would take steps to call the attention of gas consumers in their districts to the generally forgotten fact that gas burners wear out, and suggest a general overhaul of such fixtures as during the ensuing six months are destined to give the meter most employment. It would not be necessary to recommend specific manufactures; but, at the same time, a little information respecting the character and advantages of improved as contrasted with bad burners might be offered. Gas companies have done a good deal in this way to recommend gas cooking and heating. But it must not be forgotten that lighting is, after all, the mainstay of the gas industry; and the consumer of gas for this purpose deserves some consideration, and such help as may be conveniently and judiciously given him. There are districts wherein it is possible that a step of this kind might not do much good; but it could not do harm anywhere. There can be no doubt that the progress of electric lighting for what may be called luxurious interior illumination has stimulated the better class of gas consumers to desire improved lamps. The higher order of shops and other establishments of a public or semi-public character have manifested a decided partiality for the modern regenerative gas lamps, at the same time that highway authorities and others have inclined to the use of high-power lanterns of a simpler cast. Thus the field is in a great measure prepared for efforts of the kind indicated above, which may at least prevent the unwary consumer from ignorantly wasting gas by means of worn-out burners, or from falling a victim to the advertising burner quack and his canvassers.

Further consideration of the circumstances and occasions of gas explosions in dwelling houses, which formed the topic of an editorial article in the last issue of the *Journal*, inspires a feeling of thankfulness that the ignorance or carelessness of consumers in persistently using bad burners leads to no worse effects than an unduly swollen bill, aggravated by complaints of "bad light." It is very different with regard to mineral oil—the most serious competitor with gas for the patronage of the great bulk of the population. Here danger treads so closely on the heels of safety that a very slight incident causes a reversal of circumstances. It is possible that every user of mineral oil lamps has been very much oftener on the brink of disaster than he or she suspects. It is only when lamp "accidents" involving the loss of life or limb are reported in the newspapers that lamp users, seeing the slight causes set down for these mischances, occasionally realize with a shudder that similar trifles have marked their own everyday experiences, and have marveled at their own escape. These reflections arise from the perusal of recently published statements of Sir Frederick Abel and Mr. Boverton Redwood respecting the dangers incidental to the use of mineral oil lamps, and their prevention, by which the authors are desirous of supplementing, and in a measure qualifying, some earlier observations upon the same subject. Sir F. Abel is one of the greatest living authorities upon the subject of explosions in general, and on the proper handling of mineral oils for lighting purposes. Mr. Redwood is the Chemist to the Petroleum Association, and has had his attention directed to the question of lamps, their fittings and defects, in consequence of the widespread dissatisfaction which was manifested some two or three years ago with regard to the illuminating power of American petroleum as now exported. These complaints at one time attained such gravity that one of the heads of the Standard Oil Company came to England to confer with the importers; and it was stated, as the outcome of the inquiries then set on foot, that the fault lay not in the oil, but in the means whereby it was burnt. Gas engineers, who know by experience how complaints of bad gas can generally be resolved into a question of burners, are quite disposed to accept this statement. It was shown with sufficient cogency that while the character of the oil as imported had not varied, lamps and wicks had gone down in price and quality, so that it had become impossible in many cases to obtain a proper light from the oil consumed, while the use of these "cheap and nasty" appliances involved positive danger to life and property.

Thus, in regard to mineral oil lamps, the questions of safety and efficiency were found to be linked so closely that the consideration of the causes of the one result embraced the influences controlling the other; therefore it was natural that Sir F. Abel and Mr. Redwood should work together, with different motives, to the same end. A year ago the labors of these investigators had so far progressed that they were able to formulate a few plain conditions whereby a good light might be obtained with practical safety from mineral oil lamps; and these suggestions were embodied in a circular issued last October, and widely distributed by the Metropolitan Board of Works. These conditions were, shortly, that the oil reservoir should be of metal, fixed upon a broad and heavy base, with only one opening for oil where the wick-holder is inserted, and that the wick should be inclosed in a casing of sheet metal or wire gauze extending to the bottom of the reservoir. With regard to the wicks themselves, these were directed to be soft and of full size, dried at the fire before being used, and only just long enough to reach the bottom of the reservoir. The reservoir was to be filled with oil before lighting; and when the lamp was required to be extinguished, this should be done by first turning low and then blowing smartly across—not down—the chimney. There were other more or less obvious recommendations; but these were the principal. The authors have now studied the record of lamp accidents and critically examined the structure of various lamps, and have consequently arrived at several definite conclusions respecting the immediate causes of lamp explosions, and relating to circumstances which may tend to favor the production of such explosions. It is desirable that these observations should be widely known among all persons professionally or otherwise interested in the artificial lighting of dwelling houses. It not unfrequently happens that householders prefer petroleum lamps to gas for certain rooms, and with a view to particular features, such as portability, etc.; and it is eminently desirable that they should be properly informed upon the whole matter.

The portability of a mineral-oil lamp has been mentioned among its advantages; and, curiously enough, this is one of the things to which Sir F. Abel and Mr. Redwood seem to have devoted special attention. They point out that if a lamp of which the reservoir is only partly full of oil be carried or rapidly moved from one place to another so as to agitate the liquid, a mixture of vapor and air may escape from the lamp in close vicinity to the flame, where it may ignite and explode the mixture inside. If the wick does not fit the tube properly, or if the air-holes which in some lamps communicate with the interior are too large and too near the flame, a very little draught may set up such a train of escapes and ignitions of vapor as will suffice to burst the lamp and send the oil flying about the room. Of course, the less oil there is in the reservoir the more violent will be the explosion, because the vapor space in the lamp will be larger. Again, the lowering of the wick, or the burning low of the flame for any reason will overheat the burner and the surrounding metal work, which naturally induces the plentiful formation of explosive vapor from the oil within. The very reasonable idea as to the necessarily greater safety, under all conditions, of a heavy oil with a high flashing point is refuted by the authors. Their experiments have demonstrated that a lamp containing an oil of high flashing point is more liable to become heated than if it contains a comparatively light and volatile oil in consequence of the much higher temperature developed by the combustion, and of the comparative slowness with which the heavy oil is conveyed by the wick to the flame. Complete immunity from danger is, therefore, not to be secured simply by the use of oils of very high flashing point or slight volatility, the employment of which, especially in lamps unfitted for the purpose, apart from the trouble due to smokiness in burning, may even give rise to risks which are small, if not entirely absent, in the case of oils of moderately low flashing point.

A very great deal depends upon the lamp-wick, which should be loosely plaited, of long staple cotton. Otherwise the oil does not rise freely, and a longer piece of wick must be exposed to the flame; thus leading to charring and consequent diminution of capillary power. As a wick filters all the oil drawn through it, it is inexpedient to keep the same one in use too long. All these considerations, and more, have occurred to users of the Carcel and other lamps proposed from time to time for photometrical purposes; and their repetition now in connection with the economy and safety of mineral-oil lamps only tends to still further prove how uncertain must be the performance of such an apparatus as a lamp, which is so gravely influenced by every one of a hundred conditions relating to its construction and management. It is said, and with truth, that the average consumer of gas for illuminating purposes loses a great deal of the efficiency of the lighting medium for which he pays by the badness of his burners. All other things being equal, however, the consumer has tenfold the opportunities of going wrong and wasting his money in connection with oil than in the case of gas, to say nothing about the danger. On the whole, however, apart from questions of individual preference which are untouched by argument, the competition between mineral oil and gas is governed by the same consideration as that of gas and incandescent electric lighting. It is chiefly a question of expense, not only of the light itself, but also of the necessary fittings. Except where, as in Paris and other Continental towns, vexatious duties interfere with the development of trade, and offer a premium upon darkness, the cost of mineral oil light is practically the same everywhere; and a sufficient set of good lamps may be obtained at very much less than the cost of gas fittings. Even after this, mineral oil will run gas very closely in regard to cost anywhere out of Great Britain. Where the financial difficulty does not stand in the way, however, the known trouble and proved danger of oil lamps must prevail against their use. It is but now, after many years of practical experiments, that the conditions of safety for petroleum and paraffin lamps have been defined. How much longer it will be before these requirements are generally satisfied in the majority of lamps purchased and used by the poorer classes of the community may be left to conjecture.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Progress at the New Works, Brunswick, Ga.—A fortnight ago we had occasion to mention that the gas plant erected at Brunswick, by Messrs. Boardman and Jeter, went into operation on the evening of October 1st. Since that date matters have progressed smoothly and satisfactorily, and in fact a veritable boom is being experienced there. So well pleased are the authorities with the gas illumination of the streets, as supplied by the Gas Company, that they ordered the immediate erection of 50 additional posts and lanterns, to be kept up on similar terms to those originally authorized. This authorization brings the number of public lamps in Brunswick up to a total of 125. Supt. Wynne reports that, on date of November 5, 85 consumers' meters had been set, and he confidently expected to have a total of 125 consumers' names on the Company's books ere the Christmas holidays arrive. The Miner pattern of street gas lamp has been adopted by the Company. The authorities have also ordered the erection of 25 additional public hydrants—which is an increase of 100 per cent. The pressure at which the water supply is maintained is sufficiently adequate to meet the needs of all the Brunswickers.

Connelly & Co.'s Shipments for the Month of October.—The middle fall month of current year was a busy one for the Messrs. Connelly, as witness the following list of shipments which they report were made to the gas companies below enumerated:

First in magnitude comes the iron sponge department, the amounts being given in bushels: 3,000 to North station, and 2,000 to South station, Chicago, Ills.; 1,000 to Sioux City, and 500 to Davenport, Iowa; Elgin (Ills.) took 200, and Evanston (Ills.) 75; 2,000 went to the Commercial Point station, Boston, Mass.; and Brookline, Mass., absorbed 1,000; faraway Carson City (Nev.) is charged with 85; and the Milwaukee (Wis.) folks took 1,000; while Appleton (Wis.) was contented with 80; the Citizens, Newark, N. J., accepted 1,600; Youngstown, Ohio, ordered 300; Steubenville, Ohio, 2,500; and Circleville, Ohio, 120; but Coshocton, Ohio, was satisfied with 80. Brother Hookey, at Augusta, Ga., claimed 250 as his share. In the governor department the following sales were made: One 12-inch, to Waterbury, Conn.; a 10-inch to the Citizens Company, Rye, N. Y.; a 10-inch to the Bayonne and Greenville Company, Bergen Point, N. J.; 8-inch instruments to New Rochelle, N. Y., and the South station at Chicago, Ills.; and 6-inch to Dedham, Mass., and Tacoma, Wash. Ter. The exhauster shipments comprised an 8-inch to Port Chester, N. Y.; and a 6-inch to Lebanon, Ind. The Messrs. Connelly are inclined to think, from the language indulged in in various headquarters for contractors, that an exceptionally large number of new works will be constructed in the West and South during 1887. In fact, and this we may say upon our own responsibility, at least a dozen new projects are now shaping towards settlement of preliminary financial details. It would appear that some portions of the South are ripe for the development and acquirement of combined water and gas franchises; and it is needless to add that such opportunities should not be neglected, since they offer a fair margin of profit to the grantee and constructor—a profit in every respect legitimate and honest. Perhaps Georgia, Alabama, and Florida are the most likely localities, or rather these three States offer the greatest number of eligible situations; but in any event the shrewd observer need have slight fear that a tour of inspection through any of the Commonwealths on the other side of Mason and Dixon's line would result in time poorly spent.

Elected to the Presidency.—Late mail advices inform us that Mr. H. M. McLachlin has been elected President of the Paola (Kansas) Gas Light Company. Paola continues to grow amazingly; and it is odd to think that a few years ago maps of Kansas failed to show the name of Paola on their surfaces—but 'tis there "to stay" now, at any rate.

Chosen to the Secretaryship.—Mr. W. W. Allein has succeeded Mr. Berkeley Green in the office of Secretary of the Vicksburg (Miss.) Gas Light Company. The Vicksburg gas men are enjoying the reward of their patience and industry, and report a brisk state of trade. One drawback, however, to the Company's operations lies in the uneven nature of the district supplied, which, being a natural evil, must be endured, since it cannot be cured.

Gas Company at Lebanon, Ind.—Mr. R. T. Coverdale, of Cincinnati, Ohio, has almost (if not completely) furnished the construction and equipment of a new six-inch works, at Lebanon, Ind. Lebanon is the capital of Boone county, Ind., and is about 28 miles northwest of Indianapolis, Ind. Both places are connected by railroad, and Lebanon is likely to become a place of some note in the near future. Mr. Coverdale always has been noted for his missionary work in connection with "spreading the light."

What a "Dark Week" Means to the Gas Men.—Meteorologists, in this section of the United States at least, assert that in a regularly recurring cycle of five years or so we are visited with a week of extraordinarily dark day atmospheric conditions during the latter portion of October or the first days of November. At first glance one might attempt to account for the abnormal condition by asserting that such gloom prevailed only in seasons which were accompanied by lengthy droughts, and that the surrounding marshes and woodlands, as the case might be, being in a tinder-like condition, once set on fire, caused the atmosphere to become so polluted or saturated with the products of combustion as to prevent the sun's rays from "beaming kindly through"—especially in periods of quiet atmospheric motion, and during those times when the sun was partially or wholly veiled by clouds. That explanation, however, will not answer for the lower portion of New York city and the greater portion of its sister city, Brooklyn, since neither of these can be affected greatly by combustion traceable to any of the New Jersey marsh or wooded districts. If memory serves aright the year 1880 was memorable for the extreme darkness of its early November days, and the experience of the present year, in respect of the last week of October, was an exact counterpart. On both occasions the wind came strongly from the east, sweeping right in from the Atlantic, and the shopkeepers were obliged to illuminate their stores, by artificial means, from opening till closing time. The trouble could not be attributed to woodland fires, and, although the skies were clouded, no rain fell during the 48 hours of greatest day darkness in the week noted. It was supposed that the peculiar conditions were local, but accounts from the East show that their experience was similar to the one gained in 1880. To what peculiar influence the matter may be attributed, it is nevertheless a fact that the "darkness" caused many a gas man sore and anxious thought—especially in the case of those not overburdened with a plethora of holder capacity. To instance one example. Mr. Humphreys, of the Lawrence (Mass.) Gas Company, reports an increase, in 24 hours, of sendout from the normal one of 220,000 cubic feet to 350,000 cubic feet, without a note of warning; and the Lawrence case is but a type of what most of the other Eastern engineers were treated to. It would be interesting to know what the New York station of the Consolidated Company sent out in the dark period referred to as against the corresponding days of 1885; and in all probability the figures of the Brooklyn city companies would show a greater margin of variation. Unexpected dark spells are not unmixed blessings to the gas engineer.

Not Expanding Greatly.—The electric lighting promoters at Lawrence, Mass., are not making that rapid inroad on the business of the Lawrence Gas Company which they so blatantly proclaimed they would when their franchise was accorded them. They make no progress—unless it be after the manner affected by the crab—and are not likely to make any.

They Own no Part of it.—In some unaccountable manner an impression seems to prevail in the minds of a few that the Hartford (Conn.) Gas

Light Company has gone into the business of electric lighting. This is not so. Neither does the Hartford Company own a single share of the Hartford Electric Light Company's stock. It may be further recorded of the Hartford Gas Light Company's managers in general, and of Mr. Harbison in particular, that they never say a thing with an intent to be understood as meaning another.

A Different Feeling Exists at Charlestown, Mass.—The Charlestown (Mass.) Gas and Electric Light Company is now operating a combined gas and electric lighting plant. The steam equipment was erected by the Jarvis Engineering Company, of Boston, and consists of a six-foot tubular boiler set with the Jarvis patent boiler setting, and an Armington-Sims Company's engine. This is connected with the dynamos direct by means of belting, thus saving the loss of power attendant upon the use of shafting. Although the Charlestown gas folks are in the electric lighting business, as a tender to their gas supply, we do not think that they are over-enthusiastic about the new departure.

Cheaper Gas for Woonsocket, R. I.—Mr. Z. M. Jenks, Superintendent of the Woonsocket Gas Company, writes us that the directors have decided to reduce the selling price of gas to $1.80 per thousand cubic feet, the new figure to take effect on all consumption registered from first instant. The former selling price was $2 per thousand. Good for little Rhody!

Cheaper Gas for Lima, Ohio.—Mr. A. C. Baxter, Jr., Secretary of the Lima Gas Light Company, under date of November 1st, notified the consumers that a discount of 40 cents per thousand cubic feet would hereafter be allowed those who settled their bills between the second and tenth days of the month. The former discount was 20 cents per thousand from the gross charge of $2.20, so the new rate is equivalent to a reduction of 20 cents per thousand. Hereafter, however, consumers must bear in mind the discount days, for no notices will be sent out, and in all cases which necessitate the sending of a collector to the consumer's home or place of business the gross rate will be charged.

Electric Sparks.—A Troy (N. Y.) correspondent sends the following, under date of Oct. 28: "The accidental crossing of an electric light wire and a fire alarm telegraph wire, at 6 o'clock last evening, damaged the fire alarm system to the amount of several hundred dollars, and cut the Rankin and Trojan Hooks houses of the fire department off from the fire alarm circuit. At the Hooks house a delicate indicator, valued at $100, was ruined. The electricity burned out the magnet of the gong, and set fire to its wooden case. A fireman, who attempted to extinguish the flames, received a severe shock. At the Rankin house the magnet of the gong was burned out. The pecuniary loss at both places is put at $500. The electric light company investigated the affair and traced the trouble to one of its wires, which, at the corner of Jacob and Ninth streets, had fallen across the wires of the fire department. Its insulator covering had worn through." Our correspondent adds: "Considerable comment is again being made in regard to the frequency with which the electric lights fail to appear during the night. The blotter at the first precinct station house contains nothing else more frequently than it does reports of arcs unlighted." Newark, N. J., Nov. 6.—"A piece of carbon from an electric light dropped on a pile of Turcoman curtains, on the second floor of Isaac N. Doty's drygoods store, at No. 161 Market street, at 8 o'clock last evening—the store was closed at the time. The carbon smouldered for a time in its snug resting place, but not for long in a state of quiescence. A passing citizen seeing a volume of smoke issuing from the windows, gave the alarm, and the salvage corps, under the direction of Chief Kiersted, put out the blaze. Loss about $350."

Killed by the Electric Current.—Associated Press despatch, from Cleveland, Ohio, bearing date of November 6th: "Edward Killios, employed by the Brush Company, while attempting to adjust a refractory electric lamp in the Grand Central Theater this evening, was instantly killed. In one hand he held a pair of pliers, the extremity of one handle of which was not insulated, and one of his boots, wet from walking through the slushy streets, touched the electric light wire. When he reached over the balcony and touched the pliers to the lamp he dropped lifeless to the floor. A patch of burned flesh on one little finger, and two small holes burned through the boot, marked the entrance and exit of the fatal current." These terrible "accidents" are becoming alarmingly frequent.

Using Oil for Fuel under the Benches of the Lima (O.) Gas Works.—We understand that Mr. Baxter, Supt. of the Lima gas plant, is using petroleum oil (found in that locality) in place of coke for keeping up the heats in the benches. He also uses the oil for enriching purposes. Coke is worth 11 or 12 cents per bushel in the Lima district, when purchased in small quantities, and it readily commands 9 cents per bushel even when disposed of in 50-bushel lots or over. The electric light promoters are prospecting in the Lima district.

Successful Exhibitors.—The jurors appointed to make awards of merit on the different classes of apparatus exhibited at the Edinburgh (Scotland) International Exhibition have made a partial report. Among the rest we note that Messrs. Thomson Brothers, Leeds, England, receive a silver medal for their display of a working bakery and patent gas oven. Chas. Wilson & Son, also of Leeds, obtained honorable mention for a collection of gas heating apparatus.

An Interesting Legal Decision.—A decision in a case recently argued before the Queen's Bench Division, England, on Oct. 26th, which will prove of interest to gas companies in the country, is here appended. The case was that of the Gas Light and Coke Company v. Smith & Company, Justice Stephen presiding. Proceedings were instituted by plaintiff to recover a gas cooking stove rented by plaintiff to a consumer in Crescent Place, St. Pancreas (and seized by the defendants), or to recover its value. The case raised the question whether a gas cooking stove was not a "fitting for the consumption of gas" within the meaning of the statutes, and therefore exempt from seizure. Justice Stephen, concurring in a recent decision in the Court of Appeal, composed of the Master of the Rolls and Lord-Justices Bowen and Fry—who held that a gas heating stove was a gas fitting—decided that a gas cooking stove was also a gas fitting within the meaning of the statutes, and that therefore the landlord was not entitled to take it for rent.

One of the Features of the Convention.—One of the most pleasing features in connection with the October gathering of the American Gas Light Association was the beautiful manner in which the lighting of the Hotel Lafayette was accomplished through the agency of the Lungren lamps. The following figures will explain the way in which the task was performed:

Apartment.	Number of Lamps.	Consumption per Hour, Each.
Dining room	3	16 cu. ft.
Ladies' café	1	16 "
Ladies' reception room	1	12 "
Gentlemen's reading room	1	16 "
" " "	1	12 "
Gentlemen's café	3	16 "
" "	8	12 "
Hotel office	2	16 "

The illumination was thoroughly effective and most agreeable, in proof whereof we have only to say that the hotel proprietors, upon the adjournment of the Convention, entered into a negotiation with the Siemens-Lungren Company which resulted in the permanent retention of the lamps in the service of the Hotel Lafayette. The Siemens-Lungren Company conceived the idea that an illustration of the practical working of the Lungren burner would please the delegates, and that expectation was fully realized.

Named as Commissioner-General for the United States.—An "International Railway Exposition and Congress," opening in May and to close in October, 1877, is to be held in Paris, France. It goes without saying that the French people are adepts in such matters, and from present indications the Exposition project is likely to create a great stir in this country—a land pre-eminent in railway engineering and construction, not to mention anything about the financier ng details of the business. Mr. John W. Weston, Managing Editor of the *American Engineer*, published in Chicago, Ill., has been named as Commissioner-General for the United States in connection with this country's relations to the proposed exhibition. He is an indefatigable worker, and in selecting him the Frenchmen showed good judgment. Mr. Weston's address is "Gaff Building, No. 236 La Salle street, Chicago, Ill."

Show What it Can Do.—The managers of the Meridian (Miss.) Gas Light Company have made an experiment which pleases the Meridianites mightily. Over the "pinnacle pavillion" which covers the principal public well in the town they have placed a 1,000 candle power Siemens regenerative gas lamp, in order to show what an efficient and powerful agent the people have at their command if they desire to avail themselves of it for illuminating large areas. Perhaps Meridian might be prevailed upon to order a few Siemens lamps for her streets.

Twelve Candle Power.—It is quite likely that General Hickenlooper will before long see his way clear toward making a reduction in the sale schedule at Cincinnati, Ohio, although the present contract with the authorities empowers the Cincinnati Gas Company to charge $1.60 per thousand to private consumers, and to receive $1.15 per thousand for gas supplied to the street lamps, until February, 1890. It is an open secret that many of the greatest users or consumers, such as the Gibson, Galt, St. James, and other hotels, obtain their supply now, under special contract, at about $1.[illegible] per thousand; and it would not surprise us greatly if the General and his associates were to make that the general ruling figure. The probability, however, of such a course seems to have greatly disturbed the even temper

of some of Cincinnati's "best citizens," notably the genius who presides over the editorial sanctum of the *Enquirer*, who in his agony cries out aloud, "To reduce the price of gas means to reduce its quality, already too poor, and to increase the monthly gas bills. Consumers don't want any hot air pumped through the meters and measured as gas. The law of the State of Ohio requires every gas corporation in the State to furnish gas of twelve candle power. The citizens of Cincinnati have suffered very patiently, and for, lo! these many days, etc." Poor, dear, dazed *Enquirer!* And what can its Editor be suffering from that causes him to discourse thus? "Hot air measured as gas," "reduce the price to increase the bills," "gas not of twelve candle power"—we fear the Gods are about to call him away from the delights of his Ohio home; for does he not show symptoms of madness?

A Prosperous Gas Company.—We are indebted to Mr. W. H. Pearson for some facts and figures in regard to the showing made by the Toronto Consumers Gas Company, during the year ended Sept. 30th, 1886, the thirty-eighth year of the company's existence. The President, Mr. James Austin, in his report to the directors, mentions that the rapid increase in consumption rendered necessary many alterations and improvements to the works, and these included the erection of a new stack of ten benches of sixes, heated by improved methods, and equipped with every improved modern appliance; two large multitubular condensers; a Standard washer-scrubber, of one million cu ft. capacity each 24 hours; two exhausters with engines; a 12 by 12 foot station meter; four 24 by 20 by 4 foot purifiers, with 20 inch center-valve; and a suitable addition to the purifying house to accommodate the same. During the year 14,311 yards of new mains were laid, and 1,140 new services put down. On October first, 1885, gas rates were reduced, in accordance with quantities consumed, to $1.25, $1.15, $1.10, and $1—the latter rate being charged for gas used in cooking stoves, engines, etc. These concessions were made from the former schedule of $1.50, $1.30, $1.30, $1.25, and will be noted as having been pretty steep. Now, let us see how the business of the company was affected thereby. The total output for the year ended September 30, 1886, was 307,194,000 cu. ft., showing an increase of 33,710,000 (12.3 per cent.) cubic feet over its predecessor, and that gain was made notwithstanding the widespread success which attended the early closing movement in Toronto this summer. This meant that a large number of the shops and stores ceased to do business at 1 P.M. on Saturdays, whereas the former practice was to allow them to remain open until 10 or 11 P.M. Again, the population of Toronto was augmented during the year by only a 6 per cent. increase. But the most convincing fact of the good sense of the reduction policy is shown in the return of number of consumers. At the end of this fiscal year the books showed a total of 7,861 against 6,778 in '85, or the astounding increase of 1,083, notable when it is considered that out of the 6 per cent. increase in population not 30 per cent. of same became direct customers of the company. Mr. Pearson knew what he was doing when he urged this cheapening policy some years ago upon his board, and time has furnished ample vindication of his sagacity. After vexatious and protracted delays and negotiations a five-year contract—commencing with Jan. 1st, 1886—was entered into with the authorities on account of the street lighting. Under its tenets the company receives $20.50 per post per annum, which is $3.85 less per post than that charged under the agreement immediately preceding. Ninety-three Lambeth lanterns are now in duty, and these have, in many cases, either superseded or prevented the employment of arc lights. The illuminating power of the gas supplied has averaged 18 candles for the year; and the number of street lamps kept in duty this year is placed at 2,768 as against 2,557 in 1885, or an increase of 211. It might be said, in reverting to the increase in sendout, the quantity taken up by gas stoves and gas engines was fully 25 per cent. greater than that of the preceding year. The balance sheets of the company show most eloquently how careful management and fair dealing are requited, and Mr. Pearson, without doubt, must be credited with no small share of the success which has attended the Toronto Gas Company's operations. At the annual election (held October 25) the Board of Directors effected permanent organization for ensuing fiscal year by re-electing Mr. Jas. Austin to the office of President, a like course being pursued in the case of Vice-President, which position is occupied by Dr. L. W. Smith. Mr. W. H. Pearson continues on in the Secretary's office. In current year the company will construct another large gasholder.

Correspondence

[The Journal is not responsible for the opinions expressed by correspondents.]

Mr. Jno. Somerville Replies to "W. M."

70 Bankside, London, England, Oct. 26, 1886.

To the Editor American Gas Light Journal:

In your issue of Oct. 2d I notice a criticism on the little paper I read before our Gas Institute, in June last, on the "Economical Construction of Gasholders and Tanks."

I am very pleased to see it interested some of your readers on your side of the Atlantic, and I can assure your correspondent, "W. M," that he need not offer any apology nor beg any one's pardon, "in attempting to instruct us," or "to give our English brethren a hint or two." I, for one, shall always be very glad to "sit up" and listen attentively to any one from any quarter of the world who will correct or instruct me; and I am very much obliged to "W. M." for giving me a little insight into the American practice of gasholder construction.

I believe it would be for the mutual benefit of both countries if a little friendly and free international criticism were oftener indulged in, in the pages of your and other journals devoted to engineering and mechanical pursuits. No doubt if this were done we should be able to learn from each other the best method and manner of doing many things—the best way of manufacturing and distributing gas, construction and maintenance of buildings and apparatus, etc.—and so arrive at some higher degree of excellence; for, I daresay, each can learn something from the other.

I must confess, however, that I have not learned much from reading "W. M.'s" communication. He seems to have mistaken the title of my paper, which was, "Economical Construction"—not principles of construction. There is nothing new nor very good in wrought iron columns. I can show him wrought iron columns built of ½-inch boiler plate, 60 and 70 ft. high, which I saw made 20 or 30 years ago. It is also the custom here to cast vertical ribs inside the base of large cast iron columns, but not in small ones; and the examples quoted in my paper only dealt with small or medium sized holders.

My objection to the column in either cast or wrought iron goes further than the "architectural feature," even if it is "rather long drawn out." It extends to the costliness of it, as compared with the standard or stanchion, and the form of it as compared to these to resist strains.

A column (Tuscan or any other order) is designed to support a weight directly on top of it; to resist compression, not to act as a cantilever resisting a side thrust from a gale of wind, as a stanchion does, the members of which—latticed or built up web, triangle or single web—are placed in the proper position to resist any strain.

But, then, "W. M." says, in his opinion, "they are better looking than a latticed standard," and adds, "no doubt fully as cheap." Now, this is where he is wrong; and if he will only calculate the weight a wrought iron column will come to, built up of the strength he quotes, 1½-inch thick at bottom section, tapering, say, for forty feet, from 3 feet diameter at base to 2 ft. 6 in. in six sections, to ½-inch thick at top, he will find it not far short of 5½ tons; and with top and base of cast iron, as he shows it, a total of 7 tons. Now, a latticed standard that will resist double the strain which such a column will withstand can be built up so as not to exceed 2 tons in weight. Further, the appearance of a *well*-proportioned standard must be more pleasing to the eye and better looking than (as "W. M." admits) an *ill*-proportioned column. In these days of economical considerations surely gasholder framing is worth some studying so as to obtain economy combined with effectiveness.

In conclusion, I should wish to ask "W. M." what diameter of column he would propose for the framing of the large gasholder I am now superintending the erection of at our new works at East Greenwich—the tank for which (254 feet diameter by 46 feet 6 inches deep) was finished in June last, and the three outer lifts of the holder being just completed. The dimensions of the holder are 250 feet diameter, with four lifts of 45 feet each, and the rise of the crown is 20 feet; so that, when fully inflated, it will be 200 feet in height. The framing consists of 28 standards, 184 feet high, with four sets of girders and diagonal bracing, with external and internal wind-ties on top, all, of course, of wrought iron and steel.

Yours faithfully,

John Somerville.

A Rejoinder.

Crystal Carbon Light Co., Phila., Pa., Nov. 11, 1886.

To the Editor American Gas Light Journal:

Kindly allow us space to deny the truth of the statements made by Mr. Kidd in his letter published in your last issue. Only last month we were called upon to answer the attacks of this gentleman in another publication, and we are beginning to feel the monotony of following him from paper to paper to correct his inaccuracies and misstatements.

In our letter to you we stated that an injunction had been applied for against our Company by Mr. Kidd, and was dismissed with costs. We stated that he requested the Court to restrain our publishing what we hold to be true regarding his patent rights. As we showed at the trial, the publications were made in self-defence, and in view of the persecutions practiced upon us by Mr. Kidd. So much for the malicious libel. We must decline, Mr. Editor, to answer this letter in detail, as the personal matter in it is low and beneath our notice. We must, however, remind you that Mr. Kidd has posed in this country as the inventor of a scientific system of gas lighting. We condemn this in the cause of science, as we believe that anyone, in 1886, having the audacity to foist such nonsence upon the public should be held up to public ridicule and scorn.

Very truly yours,

William Smith Horry.

The Market for Gas Securities.

The quotations on city gas share market presented unusually high figures during the fortnight. Consolidated led the list. It sold up to as high as 87¼, and then sagged off somewhat, hovering for two or three days in the vicinity of 85¼ to 86. Closing bid price on Friday (Nov. 12) was 85½; but on Saturday (Nov. 13) opening of Board witnessed a small transaction at 86½, immediately followed by sales at 86¼–¼–87, which is the ruling offered price at hour of writing—12 M., Nov. 13th. As intimated in our market report for October, it is now pretty well assured that the final '86 dividend will be larger than the one paid about six months ago. However, the precise sum will soon be officially announced, and those who hold the shares for investment purpose only have no reason to be put out by the outlook. All the bear efforts imaginable cannot keep Consolidated from advancing, and it is an undoubted purchase, for investment, at anything under 95. To show how the Company's business is increasing we may mention that recently in one 24 hours the New York station is said to have sent out six millions cubic feet. It must further be remembered that the constitutionality of the measure enforcing a selling rate of $1.25 may yet be tested in the Courts. Equitable maintains the advance previously noted. The Brooklyn case is still gloomy, and the general situation remains unchanged.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 Wall St., New York City.

November 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	86	87
Central	440,000	50	—	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	121	—
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	113	—
Mutual	3,500,000	100	103	105
" Bonds	1,500,000	1000	104	106
Municipal, Bonds	750,000		—	—
Northern	125,000	50	36	—
" Scrip	108,000			
Yonkers		50	51	55
Richmond Co., S. I.	300,000	50	50	—
" Bonds	40,000	—	—	—

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TO ALL WHOM IT MAY CONCERN.

Notice is hereby given that a suit is now pending in the U. S. Circuit Court for the Northern District of Illinois against the Chicago Gas Apparatus Manufacturing Company and Newman A. Ransom, for infringing our rights under Letters Patent of the United States No. 247,925, dated October 4th, 1881, and No. 333,862, dated January 5th, 1886; and that a similar suit for like infringement has been instituted against W. S. Horry (trading as the Crystal Carbon Light Company), Arthur Kitson (trading as Kitson & Co.), and others, in the U. S. Circuit Court for the Eastern District of Pennsylvania. All persons in anywise infringing upon our rights under said Letters Patent will be prosecuted by us upon our obtaining proof of such infringement.

WALTER J. KIDD, General Manager.

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SOLE MANUFACTURERS FOR THE UNITED STATES.

"CHICAGO" Gas Stoves

MEET A LONG-FELT WANT, IN THAT THEY ARE

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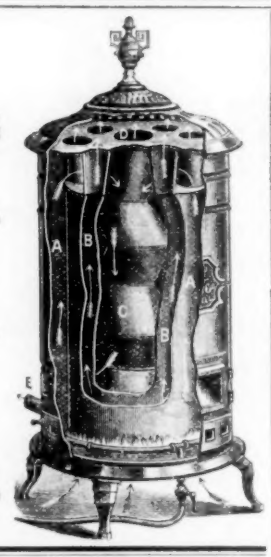

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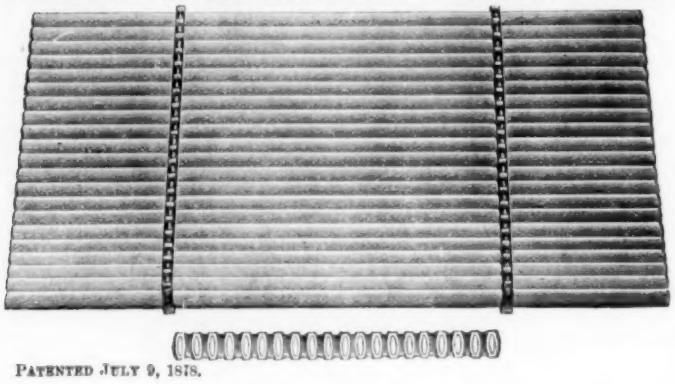

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The incoming gas passes over an extended heating surface (heated by means of the illuminating flames), and is raised to the temperature necessary to vaporize the carburetting material, which is a white, crystaline solid prepared from coal tar.

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Suits are pending in the U. S. Circuit Courts in Illinois and Pennsylvania against various persons for infringement of our Letters Patent No. 247,925, dated Oct. 4, 1881, and No. 333,862, dated Jan. 5, 1886. All persons are cautioned against manufacturing, selling, or using any apparatus or material which infringes our Patents. We intend to commence suits against all parties infringing Patents owned by us.

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We invite the attention of all practical Gas Managers to the following letter and accompanying cut. The two lines show the pressure held by the Governor on Saturday and Sunday, and clearly illustrates the accuracy of the Governor in *increasing* and *reducing* pressure *in proportion to the volume of gas consumed.*

A Governor that puts the increased pressure on at "one fell swoop" and takes it off in like manner is *not* an "Automatic" Governor; and the circulation of pressure sheets showing such action by a so-called "Automatic" Governor is a rather amusing reflection on the intelligence of Gas Managers.

Strictly speaking, a "Balanced" Governor is an "Automatic" one, as it automatically varies the volume of gas sent out to *maintain a uniform pressure* at its outlet. But, as now applied, the term "Automatic Governor" is understood to mean a Governor that will *maintain pressure between any two desired extremes, in direct proportion to the volume of gas consumed.* Therefore pressure sheets showing *instantaneous changes* from maximum to minimum and *vice versa*, circulated broadcast as the record of an "Automatic (?) Governor," reveals inexcusable ignorance of the subject, amusing to many, yet liable to mislead the inexperienced novice.

We would suggest that all Gas Companies contemplating the placing of *Automatic* Governors would consult their own interests and avoid annoying experience by adopting a Governor *that has a record.*

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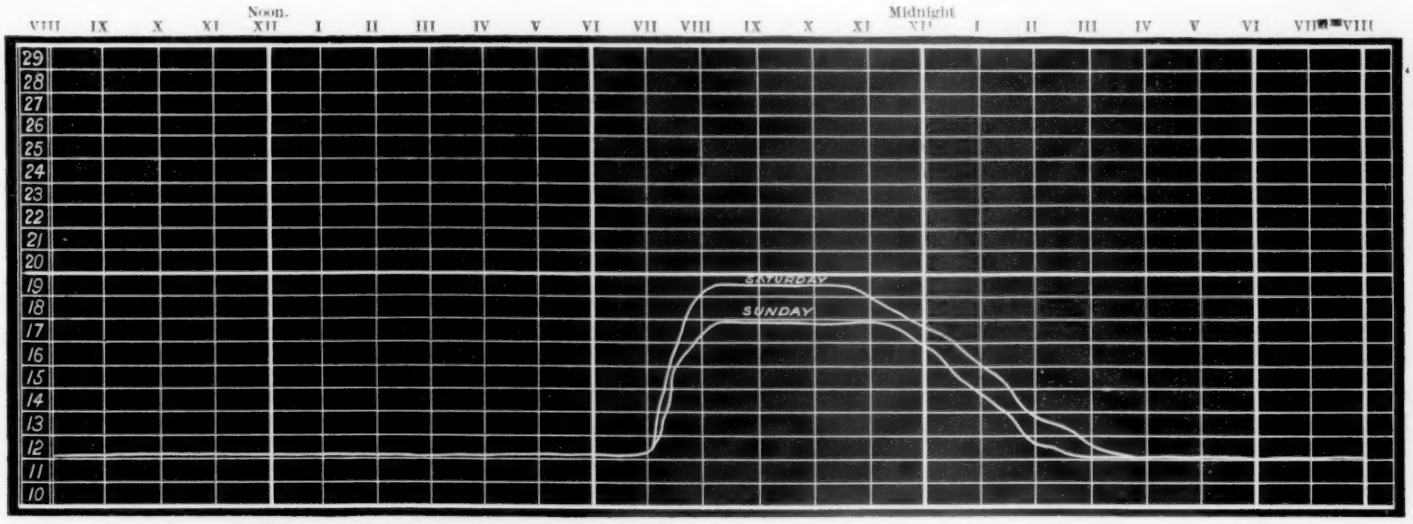
Noon.
Midnight
VIII IX X XI XII I II III IV V VI VII VIII IX X XI XII I II III IV V VI VII VIII
29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10
SATURDAY
SUNDAY

Card Showing Pressure at the Milwaukee Gas Works, Saturday, July 10, and Sunday, July 11 1886.

MILWAUKEE, WIS., August 3d, 1886.

MESSRS. CONNELLY & CO., LTD., 177 Broadway, New York:

Gentlemen—Replying to yours of 29th, I send you a little package of register sheets. When your Governor (20-inch) was set I adjusted it to give 13-tenths day pressure and 22-tenths night pressure. Saturday nights it would run up to 25-tenths. Whenever it would cloud up in the daytime it would go up at first indication of darkness to about 15-tenths. I hunted back in the sheets to find one when pressure was increased in the daytime, but it is so long since we have had a stormy day I could not find one. You can, however, see a *slight change* on sheets for June 1 and June 25. You will see, too, that lately the Governor only puts on *about* 20-*tenths maximum pressure.* This is because *less gas is burned than when it was adjusted.* We have no complaints of pressure, and everyone appears satisfied. In conclusion, can say the Governor has *never been touched* since it was first adjusted, and has at all times *done just the work we wished it to do.* Very truly yours, E. G. COWDERY, Engr. & Supt.

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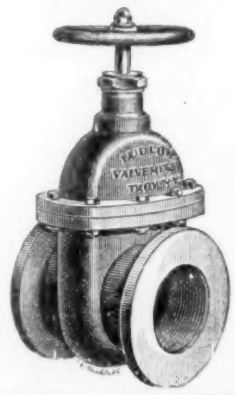

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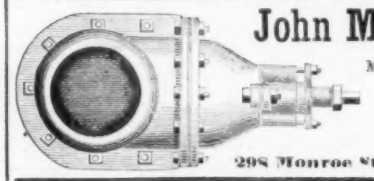

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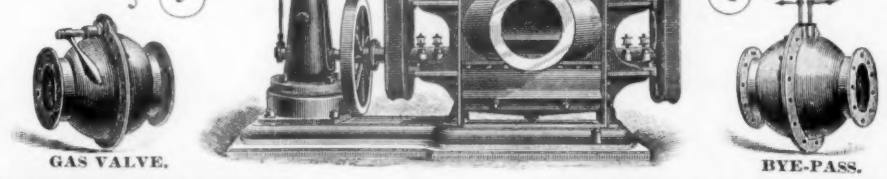

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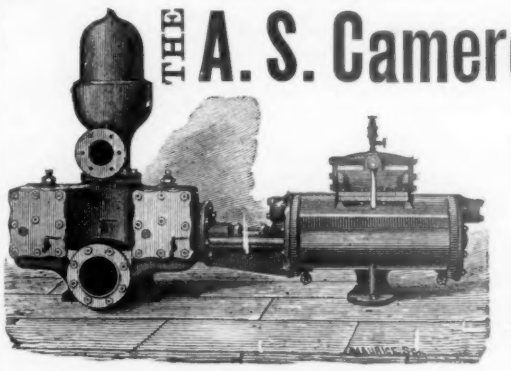

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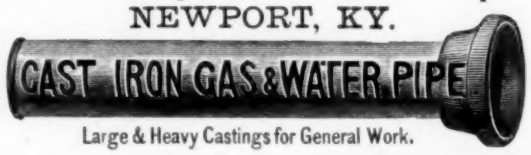

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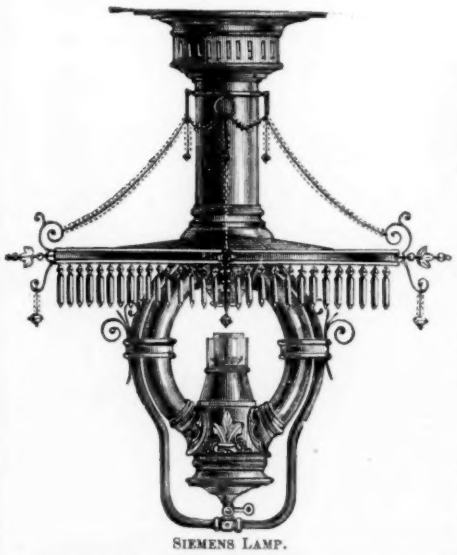

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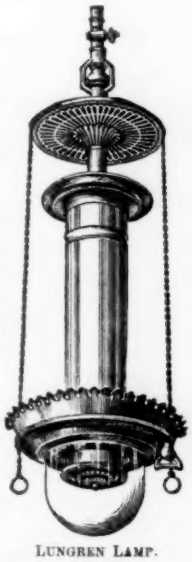

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This result is obtained

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Consequently this largely increased illumination is always maintained without further cost and frequent attention.

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THE "STANDARD" WASHER-SCRUBBER.

The "Standard" Washer-Scrubber has been adopted very generally by Gas Companies in North and South America, Europe, Asia, Australia, and New Zealand.

NO OTHER APPARATUS REMOVES ALL THE AMMONIA FROM THE GAS.

Its dimensions admit of placing it under cover without the great expense incurred in a high building to protect Tower Scrubbers from changes of temperature; thus the "Standard" Washer-Scrubber costs much less than other systems.

J. B. Crockett, Esq., President and Engineer of the San Francisco Gas Light Company, writes, under date of May 22, 1886:

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CAST-IRON PIPE 1½ to 72 Inches in Diameter.

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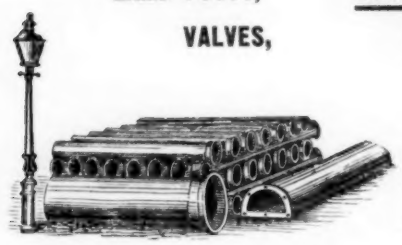

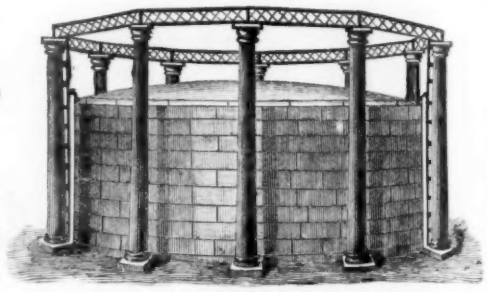

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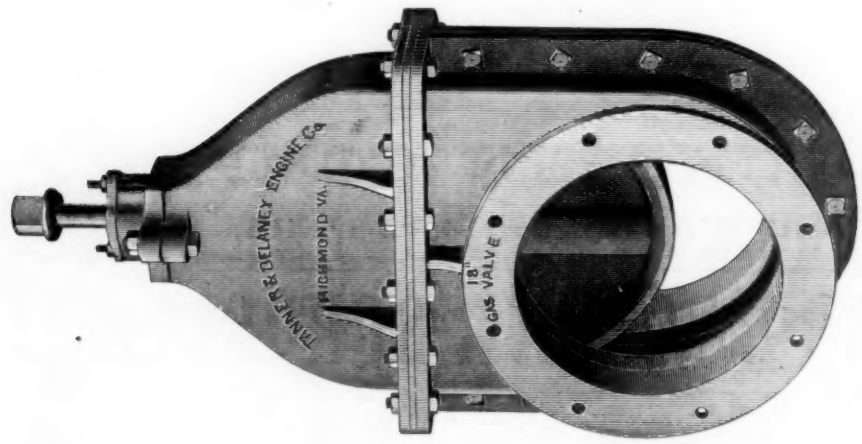

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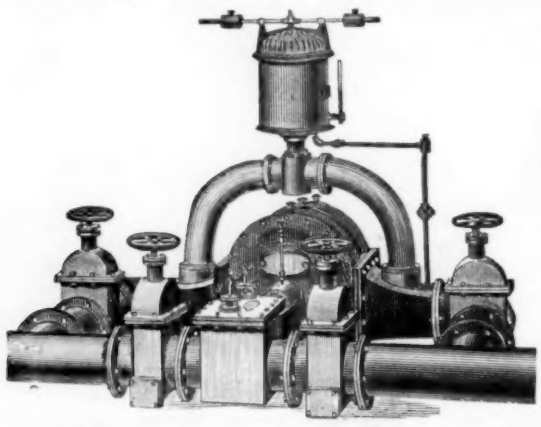

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" "	"	220,000	"
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Youngstown, Ohio	"	60,000	"
Canton, "	"	60.000	"
Akron, "	"	80,000	"
Xenia, "	"	10,000	"
Adrian, Mich	"	65,000	"
Ypsilanti, Mich	"	25,000	"
Muskegon, "	"	70,000	"
South Bend, Ind	"	70,000	"
Anderson, "	"	20,000	"
Plainfield, "	"	10,000	"
Springfield, Illinois	"	100,000	"
Evanston, "	"	50,000	"
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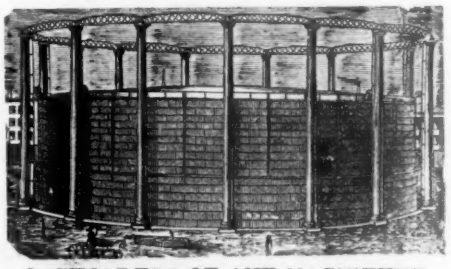

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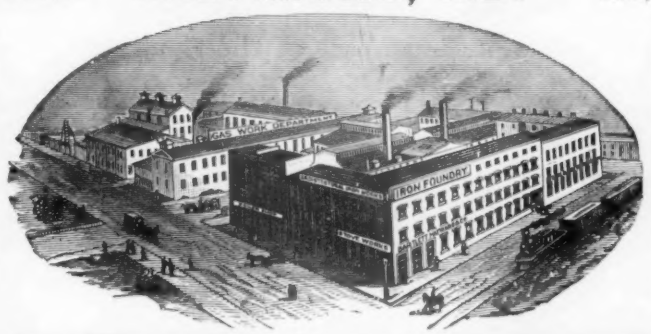

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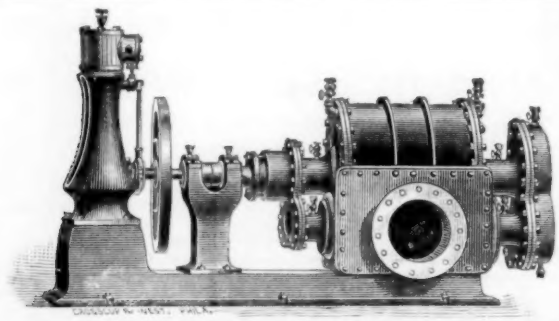

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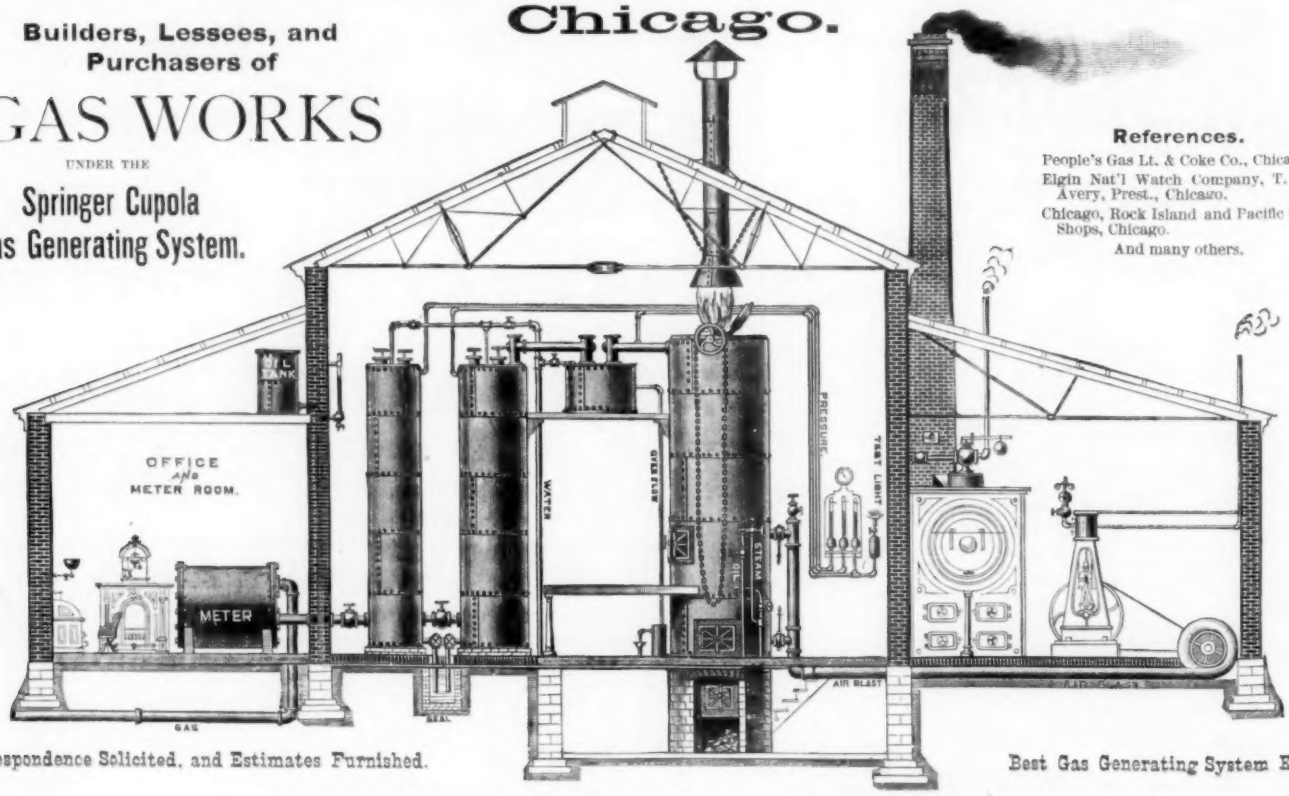

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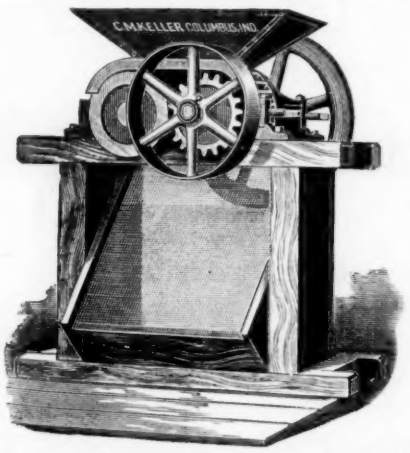

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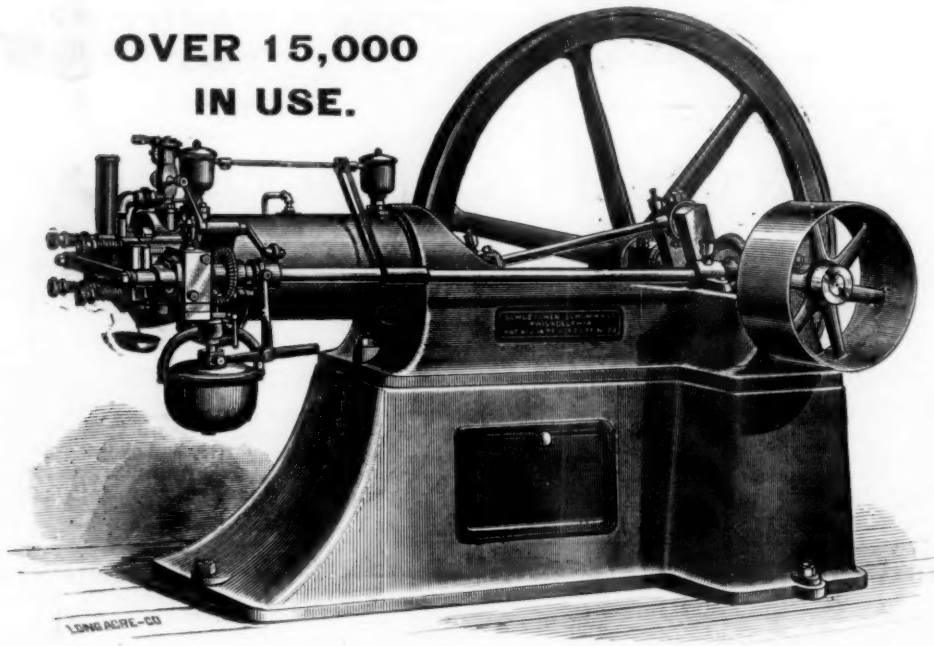

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